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ABSTRACT

In 1991, a survey was conducted at California's Sierra College (SC) to determine the types of students enrolling in algebra classes and to explore their attitudes about mathematics. The student population surveyed consisted of all students enrolled in 27 algebra class sections on the SC campus. The survey focused on students' reasons for enrolling in the algebra class, learning preferences and practices, math anxiety/reflexes and attitudes, self-description of academic ability, world view, and background information. After the elimination of unusable responses and extreme data, the final data results were based on 786 returns. The groups of students identified by their responses to survey questions included the math anxious, the underprepared, the re-entry, the underrepresented, the vocational, the transfer, and the single parent. In all, 14 group reports were generated. Study findings included the following: (1) a comparison of student and faculty responses indicated that the faculty were more critical of their students than the students were of each other; (2) younger students had higher levels of anxiety and more negative attitudes toward math than older students; (3) students perceived "mastery learning" as an important element in learning the material, suggesting that faculty should experiment with alternative teaching strategies and environments and try to match them to the needs of the student; and (4) overall, a "helpful teacher" was seen by the student groups as an important contributor to success in algebra. Appendixes provide the survey instrument and tabulated data descriptions of each of the 14 student groups identified in the survey. (JMC)

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Sierra College

ALGEBRA STUDENT SURVEY

*** RESULTS ***

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June 1991

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ABSTRACT

1. PURPOSE

The purpose was to determine the various types of students enrolling in algebra classes and explore their attitudes about mathematics in general and algebra in particular. The project involved designing and administering the Sierra College Algebra Student Survey (SCASS).

2. OVERVIEW

The groups of students identified by their responses to survey questions included: 1) the math anxious; 2) the under-prepared; 3) the re-entry; 4) under-represented; 5) the vocational; 6) the transfer; and 7) the single parent. The responses by group were obtained and a preliminary effort to characterize these groups concerning attitude, anxiety, learning preferences and practices, contributors to success in algebra and self-assessment.

3. FINDINGS

Fourteen group reports were generated. Data indicate the attitude and anxiety scales are sensible. The top three rankings (according to size of relative frequency) by twelve of the major groups on learning preferences, practices, and factors for success show almost unanimous rankings. Students assessed each other. Their responses are compared to the Carnegie Report's "faculty" responses on similar questions and contrast sharply. The faculty are more critical of their students than the students are of each other.

4. CONCLUSIONS

Regarding anxiety, attitudes, learning preferences and practices, some trends are evident. For example, the scales indicate higher levels of anxiety and more negative attitudes for younger students compared to older students who exhibit low anxiety and positive attitudes about math.

Students reveal learning practices that do not correspond to reality as perceived by teachers regarding homework and class attendance; "mastery learning" was indicated as helpful for learning algebra.

A general conclusion based on the SCASS results is that exposure to different styles of instruction in a helpful environment using mastery learning strategies may aid students to successfully complete the algebras.

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I. INTRODUCTION

The majority of community college algebra classes are teacher-paced with daily lecture. Most community college algebra classes are filled with students diverse in math experience, in age, in attitudes, and in learning styles. Success rates state-wide are about 50% thus a whole host of students are barred, some permanently, from continuing their education. Research reported by LARC (Barr, 1989) and by Tools for Learning (Gall, 1990) indicate that intervention can be successful and that it should be multi-dimensional. That is, the instruction styles must be flexible to cope with the variety of learning styles, expectations and habits of the students.

To establish an algebra program at Sierra College which can be responsive to students' learning styles and one which will provide a supportive learning environment, knowledge of the student population is required. A survey of the algebra student population seemed appropriate. Also, the survey, since named the "Sierra College Algebra Student Survey" (SCASS), when combined with course grades and GPA, might help identify the "at risk" students. Once identified, the students can be encouraged to enroll in the Individualized Learning Program (ILP) now available at Sierra College beginning in the Fall, 1991 semester.

II. CONSTRUCTION OF THE SIERRA COLLEGE ALGEBRA STUDENT SURVEY

Knowing that math phobia and test anxiety have been explored, it seemed logical that there should be some surveys or survey questions already in existence. A search was executed, and several surveys were located, but most were directed to kindergarten through 12th grade students or were not oriented to mathematics. Some of the surveys discovered include: The Underachieving Curriculum, A Mindset for Math, Learning Style Inventory (LSI), and Learning and Study Strategies Inventory (LASSI). An effort was made to obtain the Mathematics Anxiety Rating Scale (MARS) mentioned in several journal articles including "Reducing Mathematics Anxiety in the Non-Traditional Age Female Student" (Kostha, 1986), however it seemed that one had to purchase it. Several other scales were located, but none proved useable.

With the help of colleagues, experienced community college teachers, and the algebra students at Sierra College, the Sierra College Algebra Student Survey was constructed. One version was administered to selected classes in the winter of 1990. Revisions were made given the students' appraisals of the questions. The final form was administered by the math faculty to the algebra classes at the beginning of the Spring 1991 semester.

The student population consisted of all students who appeared in 27 sections of algebra on the Sierra College campus. There were twelve sections of Math A (Elementary Algebra) and fifteen sections of Math D (Intermediate Algebra) with 382 and 430 students respectively. There was a total of 818 responses to the questionnaire. There were only six questionnaires which could not be identified as Math A or Math D, rendering a final total of 812 valid, processable questionnaires.

After an analysis of the frequencies in background data concerning age, it became clear that some of the extreme data (i.e., ages 11 and 72) may have been recorded in error. To avoid any possible compromise in the results, these extreme data were omitted from the statistical analyses. The final results were based on 786 returns, a 3.9% reduction in sample size.

A. DESIGN OF THE SURVEY

There are 100 items: 80 "exploratory" items and 20 background items in addition to the age, sex, social security number, and the math class for a total of 104 responses. The average time for students to complete the questions was 30 to 35 minutes. See Appendix C for a copy of the complete survey, information, and directions to the math faculty who administered the survey.

The SCASS consists of seven sections:

I. Why Are You Here?
II. Learning Preferences and Practices
III. Your Math Reflex
IV. Attitudes About Math
V. Self-Description
VI. World View
VII. Background Information

In sections I through VI, a variety of five or six point scales were used ranging from Poor to Excellent and Don't Know; to "Not at all typical of me" to "Very much typical of me." In the background items, the choices were provided ranging from YES and NO to a list of ten areas of interest for question #100.

The "exploratory" items are original except for four questions: #54 is similar to one mentioned in New Directions in Two-Year College Mathematics (Albers, 1985); #77, 78 and 79 are similar to three questions asked of faculty in The Conditions of the Professoriate Attitudes and Trends, 1989, published by the Carnegie Foundation for the Advancement of Teaching (Carnegie Foundation, 1989).

Some background items came from Sierra College registration information; some were patterned after questions asked in the LARC Mathematics Study (Barr, 1989) and others are original.

The questions labeled as "original" are common sense questions arising from years of student contact while teaching mathematics. Consequently it is highly likely that these questions have been asked before on some questionnaire.

B. QUESTIONNAIRE CONSTRUCTION

Characteristics: The first step was to determine what characteristics of our algebra students were of interest. Twenty-four background items were drafted concerning age, sex, educational background, number of years out of school, number of years away from math, educational goals and interests, ethnic heritage and more. The next step was to draft items which were neutrally stated that would elicit responses revealing: 1) anxiety about math and testing; 2) attitudes and learning preferences concerning math and what helps them learn math; 3) the students' own assessment of math ability; 4) reasons for taking math; and 5) the "world view" of math.

In addition, several pairs of questions were designed to check to see if students were reading rather than randomly responding. For example,

items 38 and 43; 24 and 67; and 3 and 40, reveal some awareness of the intent of the question on the part of the respondents. Below are their responses:

ITEMS 3 & 40

Rate how important each of the following statements were to your decision to enroll in this math class.				
Item 3: To improve my confidence in math.				
Very Unimportant	Fairly Unimportant	Undecided	Fairly Important	Very Important
4.8%	8.6%	9.5%	36.3%	40.5%
N=818, Missing: 0.4%				

Rate how well each of the following statements describe you.				
Item 40: I feel quite confident and secure about my ability to do math.				
Not at all typical of me	Not very typical of me	Somewhat typical of me	Fairly typical of me	Very much typical of me
14.3%	22.9%	27.9%	20.7%	14.2%
N=818, MISSING: 0.1%				

ITEMS 24 & 67

Rate how well each of the following statements describe you.				
Item 24: I rarely do homework for math classes.				
Not at all typical of me	Not very typical of me	Somewhat typical of me	Fairly typical of me	Very much typical of me
48.7%	27.4%	13.4%	6.2%	4.2%
N=818, MISSING: 0.1%				

Rate how you believe each of the following will be to your success in your algebra class.				
Item 67: Completing homework assignments on time.				
Very Unimportant	Fairly Unimportant	Undecided	Fairly Important	Very Important
1.5%	1.6%	3.2%	19.9%	72.7%
N=818, MISSING: 1.1%				

ITEMS 38 & 43

Rate how well each of the following statements describe you.				
Item 38: I don't like to study math.				
Not at all typical of me	Not very typical of me	Somewhat typical of me	Fairly typical of me	Very much typical of me
17.1%	25.6%	30.6%	13.8%	12.8%
N=818, MISSING: 0.1%				

Rate how well each of the following statements describe you.				
Item 43: I enjoy mathematics.				
Not at all typical of me	Not very typical of me	Somewhat typical of me	Fairly typical of me	Very much typical of me
17.8%	21.5%	28.4%	17.8%	14.4%
N=818, MISSING: 0.0%				

Chart 1 (on the following page) shows the cross-tabulations for each of these pairs of items. This too, indicates a pattern that is sensible.

Given the consistency of the responses which indicate that the students were responding to the questions as stated, the rest of the project could be attempted.

Chart 1: Cross-Tabulations Checking for Random Response

Crosstabulation: REFLEX38 I don't like to study math
By ATTITU43 I enjoy mathematics

Hate ... Like

Count / ATTITU43.>	.not at a.11 typic. 0	.not very. typical. 1	.somewhat. typical. 2	.fairly t.ypical 3	.very muc.h typica. 4	Row Total
REFLEX38						
0 .not at all typic	14	7	17	26	76	140 / 17.1
1 not very typical	7	30	71	78	23	209 / 25.6
2 somewhat typical	28	76	110	26	10	250 / 30.6
3 fairly typical o	29	42	26	11	5	113 / 13.8
4 very much typical	68	20	8	5	4	105 / 12.9
Column Total	146 / 17.9	175 / 21.4	232 / 28.4	146 / 17.9	118 / 14.4	817 / 100.0

Like ... Hate

Number of Missing Observations = 1

Crosstabulation: LEARN24 I rarely do homework for math classes
By SELF67 completing homework assignments on time

Count / SELF67.>	.very uni.mportant. 0	.fairly u.nimporta.d 1	.undecide. 2	.fairly i.mportant 3	.very imp.ortant 4	Row Total
LEARN24						
0 not at all typic	3	1	5	52	335	396 / 48.7
1 not very typical	4	8	11	56	143	222 / 27.3
2 somewhat typical	2	2	3	31	72	110 / 13.5
3 fairly typical o	2		1	16	31	50 / 6.2
4 very much typica	1	2	6	8	18	35 / 4.3
Column Total	12 / 1.5	13 / 1.6	26 / 3.2	163 / 20.0	599 / 73.7	813 / 100.0

Number of Missing Observations = 5

Crosstabulation: WHY3 to improve my confidence in math
By REFLEX40 I feel quite confident and secure about

Count / REFLEX40.>	.not at a.11 typic. 0	.not very. typical. 1	.somewhat. typical. 2	.fairly t.ypical 3	.very muc.h typica. 4	Row Total
WHY3						
0 very unimportant	9	7	10	9	4	39 / 4.8
1 fairly unimporta	15	18	17	12	8	70 / 8.6
2 undecided	13	16	21	18	10	78 / 9.6
3 fairly important	30	66	88	69	43	296 / 36.4
4 very important	48	61	91	79	52	331 / 40.7
Column Total	115 / 14.1	168 / 20.6	227 / 27.9	187 / 23.0	117 / 14.4	814 / 100.0

Number of Missing Observations = 4

III. RESEARCH METHODS

The purpose of the questionnaire was to discover the characteristics of the students enrolling in algebra at Sierra College. In addition to the usual background information, there are several special student groupings which are of interest.

A. DEFINITIONS OF THE GROUPS OR VARIABLES

The important groups and variables are named and defined. Some groups are defined by their responses to specific items. In Appendix D, detailed definitions are given and the number, N, for each group is recorded.

Of interest is the Math Anxious group which is listed eighth. An anxiety scale was created based on questions 31 through 39. There are charts included showing the details.

Similar treatment was given to Section IV of the SCASS dealing with attitudes. An attitude scale was created using questions 43 through 47 and 49 through 51. The scale goes from a negative attitude to a positive one. Details of this scale are to be found in Appendix E under the "Summary of Selected Items", Part IV, titled "Attitudes".

Furthermore, different age groups were, for the purposes of this report, not treated as different groups; however cross-tabulations were constructed using age as a variable. The age characteristics are noted for each of fourteen groups that were created by the definitions. (Note the age groups defined in Appendix D.)

B. GROUP PROFILE:

After administering the survey and processing the data, the problem arose as to how to display the extensive data collected by the 104-item survey. In keeping with the grant proposal (see Appendix C), the decision was made to construct a data summary which would give a profile of selected groups whose responses were of major interest. But first a brief comment concerning the treatment of the "under-represented" groups of students.

1. Ethnic Heritage

Given the demography of the community where Sierra College is located the ethnic diversity is limited. Recently, however, some slight change in the numbers of ethnic minority students has occurred. Below is a table which shows the ethnic and language diversity of our algebra classes and explains why no particular ethnic groups were profiled in our report. Only about 16% of the respondents were not caucasian and no non-caucasian group was over 5% of the total population.

DEMOGRAPHY OF ETHNIC GROUPS				
ETHNIC HERITAGE	FREQUENCY	PERCENT	VALID PERCENT	TOTAL* ENROLLMENT
American Indian	24	2.9	3.0	2.0%
Asian or Pacific Island	17	2.1	2.1	2.0%
African American	17	2.1	2.1	1.0%
Caucasian	633	77.4	79.9	88.0%
Hispanic	57	7.0	7.2	5.0%
Filipino	3	.4	.4	0.5%
Other Non-Caucasian	5	.6	.6	2.0%
Other	36	4.4	4.5	2.0%
	26	3.2	MISSING	MISSING

VALID CASES: 792
MISSING CASES: 26
*"Matriculation Student Survey", Sierra Community College District, Spring 1990.

DEMOGRAPHY OF FIRST LANGUAGE GROUPS				
FIRST LANGUAGE	FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT
English	758	92.7	94.4	94.4%
Spanish	16	2.0	2.0	96.4%
Asian	6	0.7	0.7	97.1%
European	12	1.5	1.5	98.6%
Other	8	1.0	1.0	99.6%
	1	0.1	0.1	99.8%
	2	0.2	0.6	100.0%
	15	3.2	MISSING	
TOTAL	818	100.0	100.0	

VALID CASES: 803
MISSING CASES: 15

2. Profile Guide

It may be important to review the detailed description or guide for the group profile in order to easily read the data summaries which follow in Section IV, "Survey Results". The profile guide is located in Appendix E.

IV. THE SURVEY RESULTS

There are fourteen different groups whose responses to the SCASS could be reported here (see Appendices F through S for detailed results). These groups have been defined in Appendix D. Some selected groups are summarized in the following group profiles. Following the profiles, selected cross-tabulations are presented and discussed. There is also a section which focuses on the students' responses regarding learning preferences and practices, as well as success in algebra. The results from some of the self-assessment questions will also be displayed.

A. GROUP PROFILES OF SELECTED GROUPS

1. The "Under-Prepared for College Math" Profile

GROUP NAME: UNDER-PREPARED FOR COLLEGE MATH - ALL STUDENTS

GROUP PROFILE

Selected Background Items		
high school diploma	89%	(Valid N=818)
transfer students	63%	(Valid N=794)
number of class units		(Valid N=805)
1 to 8	22%	
9 to 14	57%	
15 or more	21%	
re-entry into school		(Valid N=798)
4 or fewer years	86%	
5 or more years	14%	
re-entry into math		(Valid N=794)
2 or fewer years	68%	
more than 2 years	32%	
Gender		(Valid N=818)
male	47%	
female	53%	

Age		(Valid N=786)
17-18	15%	
19-20	34%	
21-32	19%	
24-30	13%	
31-39	12%	
40-50	7%	

Area of Strongest Interest		(Valid N=774)
humanities/fine arts/english	14%	
social science	9%	
math/natural science/engineering	17%	
vocational/technical/ occupational	9%	
communications/media	5%	
business	13%	
teaching	9%	
computer science	4%	
gen. studies/liberal arts	4%	
undecided	16%	

I. Why this Class?		(Valid N=811-817)
ranked #1	88%	Item 2: Improve math skills
#2	87%	Item 1: Requirement for college program
#3	77%	Item 3: Improve confidence in math

II. Learning Preferences		(Valid N=815-818)
ranked #1	84%	Item 20: Learn best when I see teacher do examples
#2	81%	Item 22: Master one unit before moving on to the next
#3	68%	Item 13: Interested if the ideas are useful

Learning Practices		(Valid N=815-818)
ranked #1	95%	Item 27: Doing well is important
#2	76%	Item 24: Always do homework (Note: This is a "reversal")
#3	68%	Item 25: Always try hard

III. Math Reflex (Anxiety)		(Valid N=808)
		Note: The anxiety scale was established using this group.
percentile (low) #1	18%	
#2	21%	
#3	20%	
#4	20%	
(high) #5	21%	

IV. Attitude

(Valid N=808)

Note: The attitude scale was established using this group.

percentile (neg) #1	19%
#2	20%
#3	15%
#4	26%
(pos) #5	20%

V. Self-Description

Kind of h.s. student? (Valid N=816)

poor	33%
good	41%
excellent	25%
don't know	1%

Ability to solve algebra problems? (Valid N=817)

poor	48%
good	29%
excellent	16%
don't know	7%

Kind of math student? (Valid N=818)

poor	48%
good	32%
excellent	18%
don't know	2%

Kind of college student? (Valid N=814)

poor	6%
good	34%
excellent	57%
don't know	3%

Important to success in algebra? (Valid N=812-816)

Ranked #1	95%
#2	94%
#3	93%

Item 62: Helpful teacher
Item 57: Class attendance
Item 67: Completes homework on time

VI. World View

Math = rules (Valid N=813)

disagree	4%
undecided	13%
agree	83%

Math = research		(Valid N=812)
disagree	6%	
undecided	20%	
agree	74%	
No team skills taught		(Valid N=813)
disagree	37%	
undecided	28%	
agree	35%	
No learning resources		(Valid N=811)
disagree	33%	
undecided	39%	
agree	28%	
Peers under-prepared		(Valid N=810)
disagree	30%	
undecided	34%	
agree	37%	
Peers willingly work hard		(Valid N=811)
disagree	16%	
undecided	38%	
agree	46%	
Peers do only enough to get by		(Valid N=811)
disagree	21%	
undecided	36%	
agree	43%	

---

2. The "Math A" Profile

GROUP NAME: MATH A (ELEMENTARY ALGEBRA)

GROUP PROFILE

Selected Background Items

high school diploma	85%	(Valid N=374)
transfer students	65%	(Valid N=313)
number of class units		(Valid N=359)
1 to 8	22%	
9 to 14	58%	
15 or more	20%	

re-entry into school		(Valid N=82)
4 or fewer years	82%	
5 or more years	18%	
re-entry into math		(Valid N=382)
2 or fewer years	59%	
more than 2 years	41%	
Gender		(Valid N=367)
male	45%	
female	55%	
Age		(Valid N=366)
17-18	18%	
19-20	29%	
21-32	16%	
24-30	14%	
31-39	15%	
40-50	8%	
Area of Strongest Interest		(Valid N=354)
humanities/fine arts/english	16%	
social science	8%	
math/natural science/engineering	16%	
vocational/technical/ occupational	11%	
communications/media	4%	
business	10%	
teaching	11%	
computer science	3%	
gen. studies/liberal arts	5%	
undecided	15%	

I. Why this Class?			(Valid N=378-382)
ranked #1	90%	Item 2:	To improve math skills
#2	86%	Item 1:	Requirement for college program
#3	83%	Item 3:	To improve my confidence in math
II. Learning Preferences			
ranked #1	85%	Item 22:	Opportunity to master unit
#2	84%	Item 20:	Teacher does examples
#3	76%	Item 13:	Interested if new ideas are useful

Learning Practices			(Valid N=378-382)
	#1	94%	Item 27: Doing well is important
	#2	78%	Item 24: Do homework
	#3	69%	Items 25 & 26: Try hard & don't put off homework
III. Math Reflex (Anxiety)			(Valid N=376)
percentile (low)	#1	16%	
	#2	19%	
	#3	21%	
	#4	22%	
(high)	#5	22%	
IV. Attitude About Math			(Valid N=376)
percentile (neg)	#1	19%	
	#2	21%	
	#3	16%	
	#4	26%	
(pos)	#5	18%	
V. Self-Description			
Kind of h.s. student?			(Valid N=380)
	poor	40%	
	good	39%	
	excellent	20%	
	don't know	1%	
Ability to solve algebra problems?			(Valid N=381)
	poor	54%	
	good	25%	
	excellent	13%	
	don't know	8%	
Kind of math student?			(Valid N=379)
	poor	53%	
	good	30%	
	excellent	14%	
	don't know	3%	
Kind of college student?			(Valid N=378)
	poor	7%	
	good	31%	
	excellent	59%	
	don't know	3%	

Important to success in algebra?			(Valid N=376-380)
Ranked #1	95%	Items 62 & 67:	Helpful teacher and homework
#2	93%	Item 57:	Class attendance
#3	91%	Item 57:	Computation

VI. World View

Math = rules		(Valid N=377)
disagree	3%	
undecided	13%	
agree	84%	
Math = research		(Valid N=376)
disagree	5%	
undecided	21%	
agree	74%	
No team skills taught		(Valid N=376)
disagree	36%	
undecided	32%	
agree	33%	
No learning resources		(Valid N=376)
disagree	33%	
undecided	38%	
agree	29%	
Peers under-prepared		(Valid N=375)
disagree	26%	
undecided	34%	
agree	40%	
Peers willingly work hard		(Valid N=375)
disagree	15%	
undecided	38%	
agree	47%	
Peers do only enough to get by		(Valid N=376)
disagree	19%	
undecided	41%	
agree	40%	

---

3. The "Math D" Profile

GROUP NAME: MATH D (INTERMEDIATE ALGEBRA)

GROUP PROFILE

Selected Background Items		
high school diploma	90%	(Valid N=428)
transfer students	76%	(Valid N=350)
number of class units		(Valid N=426)
1 to 8	21%	
9 to 14	57%	
15 or more	22%	
re-entry into school		(Valid N=424)
4 or fewer years	90%	
5 or more years	10%	
re-entry into math		(Valid N=420)
2 or fewer years	78%	
more than 2 years	22%	
Gender		(Valid N=407)
male	50%	
female	50%	
Age		(Valid N=415)
17-18	12%	
19-20	40%	
21-32	21%	
24-30	11%	
31-39	9%	
40-50	7%	
Area of Strongest Interest		(Valid N=414)
humanities/fine arts/english	13%	
social science	10%	
math/natural science/engineering	18%	
vocational/technical/ occupational	7%	
communications/media	6%	
business	15%	
teaching	7%	
computer science	4%	
gen. studies/liberal arts	3%	
undecided	17%	

I. Why this Class?			(Valid N=428-430)
ranked	#1	88%	Item 1: Requirement for college Program
	#2	86%	Item 2: Improve math skills
	#3	73%	Item 3: Improve confidence in math
II. Learning Preferences			(Valid N=429-430)
ranked	#1	83%	Item 20: Learn best when I see teacher do examples
	#2	80%	Items 13 & 22: Like useful ideas & Master one unit before moving to the next
	#3	69%	Item 21: Practice new concepts in class
Learning Practices			(Valid N=429-430)
ranked	#1	96%	Item 27: Doing well is important
	#2	74%	Item 24: Always do homework (Note: This is a "reversal")
	#3	67%	Item 26: Don't procrastinate
III. Math Reflex (Anxiety)			(Valid N=426)
percentile (low)	#1	20%	
	#2	22%	
	#3	20%	
	#4	18%	
(high)	#5	21%	
IV. Attitude			(Valid N=426)
percentile (neg)	#1	19%	
	#2	19%	
	#3	14%	
	#4	27%	
(pos)	#5	21%	
V. Self-Description			
Kind of h.s. student?			(Valid N=430)
poor		27%	
good		44%	
excellent		28%	
don't know		1%	
Ability to solve algebra problems?			(Valid N=430)
poor		44%	
good		32%	
excellent		20%	
don't know		4%	

Kind of math student?			(Valid N=430)
poor	43%		
good	35%		
excellent	21%		
don't know	1%		
Kind of college student?			(Valid N=430)
poor	5%		
good	37%		
excellent	54%		
don't know	4%		
Important to success in algebra?			(Valid N=428-430)
Ranked #1	96%	Item 62:	Helpful teacher
#2	93%	Item 57:	Attends class
#3	92%	Item 59:	Computation

VI. World View

Math = rules		(Valid N=430)
disagree	5%	
undecided	14%	
agree	81%	
Math = research		(Valid N=430)
disagree	6%	
undecided	20%	
agree	74%	
No team skills taught		(Valid N=430)
disagree	38%	
undecided	25%	
agree	37%	
No learning resources		(Valid N=429)
disagree	33%	
undecided	39%	
agree	28%	
Peers under-prepared		(Valid N=429)
disagree	32%	
undecided	34%	
agree	34%	
Peers willingly work hard		(Valid N=430)
disagree	17%	
undecided	38%	
agree	45%	

Peers do only enough to get by		(Valid N=429)
disagree	23%	
undecided	32%	
agree	45%	

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4. The "Math Anxious" Profile

GROUP NAME: MATH ANXIOUS

GROUP PROFILE

Selected Background Items

high school diploma	91%	(Valid N=333)
transfer students	72%	(Valid N=266)
number of class units		(Valid N=331)
1 to 8	18%	
9 to 14	57%	
15 or more	25%	
re-entry into school		(Valid N=329)
4 or fewer years	91%	
5 or more years	9%	
re-entry into math		(Valid N=335)
2 or fewer years	74%	
more than 2 years	26%	
Gender		(Valid N=335)
male	38%	
female	62%	
Age		(Valid N=320)
17-18	19%	
19-20	37%	
21-32	19%	
24-30	10%	
31-39	8%	
40-50	5%	

Area of Strongest Interest		(Valid N=320)
humanities/fine arts/english	21%	
social science	10%	
math/natural science/engineering	11%	
vocational/technical/ occupational	8%	
communications/media	8%	
business	8%	
teaching	11%	
computer science	3%	
gen. studies/liberal arts	4%	
undecided	18%	

I. Why this Class?		
ranked #1	89%	Item 1: Requirement for college Program
#2	85%	Item 2: Improve math skills
#3	83%	Item 3: Improve confidence in math

II. Learning Preferences		(Valid N=332-335)
ranked #1	91%	Item 22: Master one unit before moving to the next
#2	86%	Item 20: Learn best when I see teacher do examples
#3	79%	Items 20 & 23: Examples and learn math at my own pace

Learning Practices		(Valid N=333-335)
ranked #1	95%	Item 27: Doing well is important
#2	74%	Item 28: Math assignments are more time consuming
#3	71%	Item 24: Always do homework (Note: This is a "reversal")

III. Math Reflex Anxiety		
percentile (low) #1		100% are at #4 or #5. These items defined the "Math Anxious" group.
#2		
#3		
#4		
(high) #5		

IV. Attitude		(Valid N=223)
percentile (neg) #1	34%	
#2	30%	
#3	15%	
#4	16%	
(pos) #5	4%	

V. Self-Description

Kind of h.s. student? (Valid N=334)

poor	34%
good	42%
excellent	23%
don't know	1%

Ability to solve algebra problems? (Valid N=334)

poor	75%
good	16%
excellent	3%
don't know	6%

Kind of math student?

poor	75%
good	18%
excellent	4%
don't know	3%

Kind of college student?

poor	8%
good	40%
excellent	50%
don't know	2%

Important to success in algebra? (Valid N=331-334)

Ranked #1	96%	Item 62:	Helpful teacher
#2	93%	Item 67:	Completes homework
#3	91%	Item 61:	Work completed on time

VI. World View

Math = rules (Valid N=335)

disagree	3%
undecided	13%
agree	84%

Math = research (Valid N=334)

disagree	5%
undecided	20%
agree	75%

No team skills taught (Valid N=334)

disagree	28%
undecided	27%
agree	55%

No learning resources		(Valid N=334)
disagree	25%	
undecided	40%	
agree	35%	
Peers under-prepared		(Valid N=334)
disagree	29%	
undecided	31%	
agree	40%	
Peers willingly work hard		(Valid N=334)
disagree	15%	
undecided	37%	
agree	48%	
Peers do only enough to get by		(Valid N=333)
disagree	21%	
undecided	31%	
agree	48%	

B. EXCITING CROSS-TABULATIONS

The chi-square test was used to determine independence. The p-value was used to determine the significance of the results of the chi-square test.

1. Anxiety

The following groups when cross-tabulated with "Anxiety" ARE independent: Under-prepared, under-represented, disabled, transfer and single parent. Thus, anxiety has no significant effect on the proportions of these groups. See Charts 2, 3, 4, 5 and 6.

The following groups, or variables, when cross-tabulated with "Anxiety" ARE NOT independent: Math re-entry, school re-entry, vocational, sex and age. Thus, changing anxiety levels have an effect on the proportions within these groups. See Charts 7, 8, 9, 10 and 11.

The following trends were observed:

a. A larger proportion of math re-entry, school re-entry and vocational students demonstrated low anxiety levels while the smaller proportion demonstrated high anxiety levels categories.

b. Of the students NOT in the re-entry or vocational categories, the larger proportion of students fell into the high anxiety

categories and the smaller proportion fell into the low anxiety categories.

c. The greater proportion of females fall into the high anxiety categories than fall into the low anxiety categories. As the level of anxiety increases, the proportion of females at each level increases. The trend for males is exactly the opposite: As the level of anxiety increases, the proportion of males experiencing the anxiety decreases.

d. The age and anxiety level of a student seem to be related: As the age of the student increases, the demonstrated anxiety level decreases.

It is interesting to note that according to the anxiety scale, approximately 34% of the men indicated medium to higher anxiety compared to 50% of the women.

Chart 2: Cross-Tabulation: Anxiety and Underprepared

Crosstabulation: UNDERPRE By ANXCAT

UNDERPRE / ANXCAT.>	.lowest anxiety 1.00	a.low anxiety 2.00	a.normal anxiety 3.00	a.high anxiety 4.00	.highest anxiety 5.00	Row Total
.00 not under-prepar	23	30	27	26	28	134
	17.2%	22.4%	20.1%	19.4%	20.9%	31.5%
	-5.1	1.3	3.7	-.8	.9	
1.00 under-prepared	66	61	47	59	58	291
	22.7%	21.0%	16.2%	20.3%	19.9%	68.5%
	5.1	-1.3	-3.7	.8	-.9	
Column Total	89	91	74	85	86	425
	20.9%	21.4%	17.4%	20.0%	20.2%	100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
2.33964	4	.6736	23.332	None

Number of Missing Observations = 393

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Chart 3: Cross-Tabulation: Anxiety and Underrepresented

Crosstabulation: UNDEREP By ANXCAT

ANXCAT.>	Count / Row Pct / Residual.	1.00. lowest anxiety	2.00. low anxiety	3.00. normal anxiety	4.00. high anxiety	5.00. highest anxiety	Row Total
UNDEREP							
.00 not under-repres	Count	115	130	130	127	137	639
	Row Pct	18.0%	20.3%	20.3%	19.9%	21.4%	79.1%
	Residual.	-1.3	-.5	2.7	-1.9	1.0	
1.00 under-represente	Count	32	35	31	36	35	169
	Row Pct	18.9%	20.7%	18.3%	21.3%	20.7%	20.9%
	Residual.	1.3	.5	-2.7	1.9	-1.0	
Column Total		147 18.2%	165 20.4%	161 19.9%	163 20.2%	172 21.3%	808 100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
.51033	4	.9725	30.746	None

Number of Missing Observations = 10

Chart 4: Cross-Tabulation: Anxiety and Disabled

Crosstabulation: DISABLED do you have a medically verifiable disab By ANXCAT

ANXCAT.>	Count / Row Pct / Residual.	1.00. lowest anxiety	2.00. low anxiety	3.00. normal anxiety	4.00. high anxiety	5.00. highest anxiety	Row Total
DISABLED							
0 not disabled	Count	131	152	147	151	153	734
	Row Pct	17.8%	20.7%	20.0%	20.6%	20.8%	92.7%
	Residual.	-3.4	.0	4.3	.9	-1.8	
1 disabled	Count	14	12	7	11	14	58
	Row Pct	24.1%	20.7%	12.1%	19.0%	24.1%	7.3%
	Residual.	3.4	-.0	-4.3	-.9	1.8	
Column Total		145 18.3%	164 20.7%	154 19.4%	162 20.5%	167 21.1%	792 100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
3.25694	4	.5158	10.619	None

Number of Missing Observations = 26

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Chart 5: Cross-Tabulation: Anxiety and Transfer

Crosstabulation: TRANSFER By ANXCAT

ANXCAT.>	Count / Row Pct / Residual	.lowest anxiety 1.00	a.low anxiety 2.00	.normal anxiety 3.00	a.high anxiety 4.00	anx.highest anxiety 5.00	Row Total
TRANSFER							
.00 not transfer	Count	61	62	67	74	70	334
	Row Pct	18.3%	18.6%	20.1%	22.2%	21.0%	41.3%
	Residual	.2	-6.2	.4	6.6	-1.1	
1.00 transfer	Count	86	103	94	89	102	474
	Row Pct	18.1%	21.7%	19.8%	18.8%	21.5%	58.7%
	Residual	-.2	6.2	-.4	-6.6	1.1	
Column Total		147 18.2%	165 20.4%	161 19.9%	163 20.2%	172 21.3%	808 100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
2.10722	4	.7160	60.765	None

Number of Missing Observations = 10

Chart 6: Cross-Tabulation: Anxiety and Single Parent

Crosstabulation: SINGPAR By ANXCAT

ANXCAT.>	Count / Row Pct / Residual	.lowest anxiety 1.00	a.low anxiety 2.00	.normal anxiety 3.00	a.high anxiety 4.00	anx.highest anxiety 5.00	Row Total
SINGPAR							
.00 not single paren	Count	133	147	152	153	164	749
	Row Pct	17.8%	19.6%	20.3%	20.4%	21.9%	92.7%
	Residual	-3.3	-6.0	2.8	1.9	4.6	
1.00 single parent	Count	14	18	9	10	8	59
	Row Pct	23.7%	30.5%	15.3%	16.9%	13.6%	7.3%
	Residual	3.3	6.0	-2.8	-1.9	-4.6	
Column Total		147 18.2%	165 20.4%	161 19.9%	163 20.2%	172 21.3%	808 100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
7.05439	4	.1330	10.734	None

Number of Missing Observations = 10

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Chart 7: Cross-Tabulation: Anxiety and Math Re-Entry

Crosstabulation: REMATH By ANXCAT

ANXCAT.>	Count / Row Pct / Residual.	1.00. lowest anxiety	2.00. low anxiety	3.00. normal anxiety	4.00. high anxiety	5.00. highest anxiety	Row Total
REMATH							
.00 not math reentry	Count	84	118	107	118	133	560
	Row Pct	15.0%	21.1%	19.1%	21.1%	23.8%	69.3%
	Residual.	-17.9	3.6	-4.6	5.0	13.8	
1.00 math reentry	Count	63	47	54	45	39	248
	Row Pct	25.4%	19.0%	21.8%	18.1%	15.7%	30.7%
	Residual.	17.9	-3.6	4.6	-5.0	-13.8	
Column Total		147 18.2%	165 20.4%	161 19.9%	163 20.2%	172 21.3%	808 100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
17.14522	4	.0018	45.119	None

Number of Missing Observations = 10

Chart 8: Cross-Tabulation: Anxiety and School Re-Entry

Crosstabulation: RESCHOOL By ANXCAT

ANXCAT.>	Count / Row Pct / Residual.	1.00. lowest anxiety	2.00. low anxiety	3.00. normal anxiety	4.00. high anxiety	5.00. highest anxiety	Row Total
RESCHOOL							
.00 not school reent	Count	113	141	141	149	155	699
	Row Pct	16.2%	20.2%	20.2%	21.3%	22.2%	86.5%
	Residual.	-14.2	-1.7	1.7	8.0	6.2	
1.00 school reentry	Count	34	24	20	14	17	109
	Row Pct	31.2%	22.0%	18.3%	12.8%	15.6%	13.5%
	Residual.	14.2	1.7	-1.7	-8.0	-6.2	
Column Total		147 18.2%	165 20.4%	161 19.9%	163 20.2%	172 21.3%	808 100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
17.29013	4	.0017	19.830	None

Number of Missing Observations = 10

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Chart 9: Cross-Tabulation: Anxiety and Vocational

Crosstabulation: VOCATION By ANXCAT

ANXCAT.> / VOCATION	Count / Row Pct / Residual	1.00 .lowest anxiety	2.00 a.low anxiety	3.00 anxi.normal	4.00 a.high anxiety	5.00 anx.highest anxiety	Row Total
.00 not vocational	Count	123	142	141	142	164	712
	Row Pct	17.3%	19.9%	19.8%	19.9%	23.0%	88.1%
	Residual	-6.5	-3.4	-.9	-1.6	12.4	
1.00 vocational	Count	24	23	20	21	8	96
	Row Pct	25.0%	24.0%	20.8%	21.9%	8.3%	11.9%
	Residual	6.5	3.4	.9	1.6	-12.4	
Column Total		147 18.2%	165 20.4%	161 19.9%	163 20.2%	172 21.3%	808 100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
12.23140	4	.0157	17.465	None

Number of Missing Observations = 10

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Chart 10: Cross-Tabulation: Anxiety and Sex

Crosstabulation: SEX By ANXCAT

ANXCAT.> / SEX	Count / Row Pct / Residual	1.00 .lowest anxiety	2.00 a.low anxiety	3.00 anxi.normal	4.00 a.high anxiety	5.00 anx.highest anxiety	Row Total
1 male	Count	74	86	82	65	58	365
	Row Pct	20.3%	23.6%	22.5%	17.8%	15.9%	47.3%
	Residual	8.7	11.2	11.0	-10.3	-20.6	
2 female	Count	64	72	68	94	108	406
	Row Pct	15.8%	17.7%	16.7%	23.2%	26.6%	52.7%
	Residual	-8.7	-11.2	-11.0	10.3	20.6	
Column Total		138 17.9%	158 20.5%	150 19.5%	159 20.6%	166 21.5%	771 100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
21.50188	4	.0003	65.331	None

Number of Missing Observations = 47

Chart 11: Cross-Tabulation: Anxiety and Age

Crosstabulation: AGE By ANXCAT

ANXCAT.> AGE	Count / Row Pct / Residual	1.00 lowest anxiety	2.00 low anxiety	3.00 normal anxiety	4.00 high anxiety	5.00 highest anxiety	Row Total
1	Count	15	21	18	32	30	116
	Row Pct	12.9%	18.1%	15.5%	27.6%	25.9%	14.9%
	Residual	-5.9	-2.5	-5.8	8.5	5.6	
2	Count	36	56	55	47	72	266
	Row Pct	13.5%	21.1%	20.7%	17.7%	27.1%	34.3%
	Residual	-12.0	2.2	.5	-6.8	16.1	
3	Count	25	27	34	32	29	147
	Row Pct	17.0%	18.4%	23.1%	21.8%	19.7%	18.9%
	Residual	-1.5	-2.7	3.9	2.3	-1.9	
4	Count	23	25	17	22	11	98
	Row Pct	23.5%	25.5%	17.3%	22.4%	11.2%	12.6%
	Residual	5.3	5.2	-3.1	2.2	-9.6	
5	Count	28	19	16	17	10	90
	Row Pct	31.1%	21.1%	17.8%	18.9%	11.1%	11.6%
	Residual	11.8	.8	-2.4	-1.2	-8.9	
6	Count	13	9	19	7	11	59
	Row Pct	22.0%	15.3%	32.2%	11.9%	18.6%	7.6%
	Residual	2.4	-2.9	6.9	-4.9	-1.4	
Column Total	Count	140	157	159	157	163	776
	Row Pct	18.0%	20.2%	20.5%	20.2%	21.0%	100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
46.14460	20	.0008	10.644	None

Number of Missing Observations = 42

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2. Attitude

The following groups when cross-tabulated with "Attitude" ARE independent: Under-prepared, under-represented, transfer, single parent and sex. Thus, knowing the attitude level has no significant effect on the "proportions" within these groups. See Charts 12, 13, 15, 16 and 20.

The following groups, when cross-tabulated with "Attitude" ARE NOT independent: Math re-entry, school re-entry, vocational, disabled and age. Thus, knowing the attitude does have a significant effect on the "proportions" within these groups. See Charts 17, 18, 19, 14 and 21.

The following trends were observed:

a. There were no observable trends relating the knowledge of the sex of a student to the opinions about what their attitude is as measured by the attitude scale.

b. The age and attitudes of a student seem to reveal the following trend: As the age of the student increases, the "positiveness" of the demonstrated "attitude" increases. As the age of the student decreases, the "negativeness" of the student increases.

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Chart 12: Cross-Tabulation: Attitude and Underprepared

Crosstabulation: UNDERPRE By ATTCAT

ATTCAT.> Count / Row Pct / Residual	very neg. 1.00	negative attitud. 2.00	normal attitude 3.00	positive attitud. 4.00	very pos. itive at. 5.00	Row Total
UNDERPRE						
.00 not under-prepar	27 20.0% 2.2	30 22.2% 6.8	21 15.6% .3	38 28.1% -2.8	19 14.1% -6.5	135 31.8%
1.00 under-prepared	51 17.6% -2.2	43 14.9% -6.8	44 15.2% -.3	90 31.1% 2.8	61 21.1% 6.5	289 68.2%
Column Total	78 18.4%	73 17.2%	65 15.3%	128 30.2%	80 18.9%	424 100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
5.85105	4	.2106	20.696	None

Number of Missing Observations = 394

Chart 13: Cross-Tabulation: Attitude and Underrepresented

Crosstabulation: UNDEREP By ATTCAT

ATTCAT.>	Count / Row Pct / Residual	.very neg.ative at. 1.00.	negative.attitud. 2.00.	normal attitude 3.00.	a.positive.attitud. 4.00.	very pos.itive at. 5.00.	Row Total
UNDEREP							
.00	Count	123	128	93	164	130	638
not under-repres	Row Pct	19.3%	20.1%	14.6%	25.7%	20.4%	79.0%
	Residual	3.0	2.5	-2.5	-5.8	2.9	
1.00	Count	29	31	28	51	31	170
under-represente	Row Pct	17.1%	18.2%	16.5%	30.0%	18.2%	21.0%
	Residual	-3.0	-2.5	2.5	5.8	-2.9	
Column Total		152 18.8%	159 19.7%	121 15.0%	215 26.6%	161 19.9%	808 100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
2.14020	4	.7100	25.458	None

Number of Missing Observations = 10

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Chart 14: Cross-Tabulation: Attitude and Disabled

Crosstabulation: DISABLED do you have a medically verifiable disab By ATTCAT

ATTCAT.>	Count / Row Pct / Residual	.very neg.ative at. 1.00.	negative.attitud. 2.00.	normal attitude 3.00.	a.positive.attitud. 4.00.	very pos.itive at. 5.00.	Row Total
DISABLED							
0	Count	143	138	115	200	137	733
not disabled	Row Pct	19.5%	18.8%	15.7%	27.3%	18.7%	92.6%
	Residual	3.2	-2.7	3.9	3.8	-8.3	
1	Count	8	14	5	12	20	59
disabled	Row Pct	13.6%	23.7%	8.5%	20.3%	33.9%	7.4%
	Residual	-3.2	2.7	-3.9	-3.8	8.3	
Column Total		151 19.1%	152 19.2%	120 15.2%	212 26.8%	157 19.8%	792 100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
10.92838	4	.0274	8.939	None

Number of Missing Observations = 26

Chart 15: Cross-Tabulation: Attitude and Transfer

Crosstabulation: TRANSFER By ATTCAT

ATTCAT.> / TRANSFER	Count / Row Pct / Residual.	.very neg. ative at. 1.00.	negative. attitud. 2.00.	normal a. ttitude 3.00.	positive. attitud. 4.00.	very pos. itive at. 5.00.	Row Total
.00 not transfer	Count	69	77	44	89	59	338
	Row Pct	20.4%	22.8%	13.0%	26.3%	17.5%	41.8%
	Residual.	5.4	10.5	-6.6	-.9	-8.3	
1.00 transfer	Count	83	82	77	126	102	470
	Row Pct	17.7%	17.4%	16.4%	26.8%	21.7%	58.2%
	Residual.	-5.4	-10.5	6.6	.9	8.3	
Column Total		152 18.8%	159 19.7%	121 15.0%	215 26.6%	161 19.9%	808 100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
6.91892	4	.1402	50.616	None

Number of Missing Observations = 10

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Chart 16: Cross-Tabulation: Attitude and Single Parent

Crosstabulation: SINGPAR By ATTCAT

ATTCAT.> / SINGPAR	Count / Row Pct / Residual.	.very neg. ative at. 1.00.	negative. attitud. 2.00.	normal a. ttitude 3.00.	positive. attitud. 4.00.	very pos. itive at. 5.00.	Row Total
.00 not single paren	Count	145	152	106	199	146	748
	Row Pct	19.4%	20.3%	14.2%	26.6%	19.5%	92.6%
	Residual.	4.3	4.8	-6.0	-.0	-3.0	
1.00 single parent	Count	7	7	15	16	15	60
	Row Pct	11.7%	11.7%	25.0%	26.7%	25.0%	7.4%
	Residual.	-4.3	-4.8	6.0	.0	3.0	
Column Total		152 18.8%	159 19.7%	121 15.0%	215 26.6%	161 19.9%	808 100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
9.06003	4	.0596	8.985	None

Number of Missing Observations = 10

Chart 17: Cross-Tabulation: Attitude and Math Re-Entry

Crosstabulation: REMATH By ATTCAT

ATTCAT.>	Count / Row Pct / Residual	.very neg.ative at. 1.00.	.negative attitud. 2.00.	.normal attitude 3.00.	a.positive attitud. 4.00.	.very pos.itive at. 5.00.	Row Total
REMATH							
.00 not math reentry		110	120	76	152	99	557
	Row Pct	19.7%	21.5%	13.6%	27.3%	17.8%	68.9%
	Residual	5.2	10.4	-7.4	3.8	-12.0	
1.00 math reentry		42	39	45	63	62	251
	Row Pct	16.7%	15.5%	17.9%	25.1%	24.7%	31.1%
	Residual	-5.2	-10.4	7.4	-3.8	12.0	
Column Total		152	159	121	215	161	808
		18.8%	19.7%	15.0%	26.6%	19.9%	100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
10.60755	4	.0313	37.588	None

Number of Missing Observations = 10

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Chart 18: Cross-Tabulation: Attitude and School Re-Entry

Crosstabulation: RESCHOOL By ATTCAT

ATTCAT.>	Count / Row Pct / Residual	.very neg.ative at. 1.00.	.negative attitud. 2.00.	.normal attitude 3.00.	a positive attitud. 4.00.	.very pos.itive at. 5.00.	Row Total
RESCHOOL							
.00 not school reent		141	145	106	185	120	697
	Row Pct	20.2%	20.8%	15.2%	26.5%	17.2%	86.3%
	Residual	9.9	7.8	1.6	-.5	-18.9	
1.00 school reentry		11	14	15	30	41	111
	Row Pct	9.9%	12.6%	13.5%	27.0%	36.9%	13.7%
	Residual	-9.9	-7.8	-1.6	.5	18.9	
Column Total		152	159	121	215	161	808
		18.8%	19.7%	15.0%	26.6%	19.9%	100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
27.56480	4	.0000	16.623	None

Number of Missing Observations = 10

Chart 19: Cross-Tabulation: Attitude and Vocational

Crosstabulation: VOCATION By ATTCAT

ATTCAT.>	Count / Row Pct / Residual.	.very neg.ative at. 1.00.	negative.attitud.ttitude 2.00.	normal a.attitud.ttitude 3.00.	positive.attitud.itive at. 4.00.	very pos. 5.00.	Row Total
VOCATION							
.00 not vocational		139	150	102	187	131	709
	Row Pct	19.6%	21.2%	14.4%	26.4%	18.5%	87.7%
	Residual.	5.6	10.5	-4.2	-1.7	-10.3	
1.00 vocational		13	9	19	28	30	99
	Row Pct	13.1%	9.1%	19.2%	28.3%	30.3%	12.3%
	Residual.	-5.6	-10.5	4.2	1.7	10.3	
Column Total		152	159	121	215	161	808
		18.8%	19.7%	15.0%	26.6%	19.9%	100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
15.91788	4	.0031	14.825	None

Number of Missing Observations = 10

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Chart 20: Cross-Tabulation: Attitude and Sex

Crosstabulation: SEX By ATTCAT

ATTCAT.>	Count / Row Pct / Residual.	.very neg.ative at. 1.00.	negative.attitud.ttitude 2.00.	normal a.attitud.ttitude 3.00.	positive.attitud.itive at. 4.00.	very pos. 5.00.	Row Total
SEX							
1 male		68	80	50	97	72	367
	Row Pct	18.5%	21.8%	13.6%	26.4%	19.6%	47.6%
	Residual.	-1.5	5.3	-2.8	.8	-1.8	
2 female		78	77	61	105	83	404
	Row Pct	19.3%	19.1%	15.1%	26.0%	20.5%	52.4%
	Residual.	1.5	-5.3	2.8	-.8	1.8	
Column Total		146	157	111	202	155	771
		18.9%	20.4%	14.4%	26.2%	20.1%	100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
1.15687	4	.8851	52.837	None

Number of Missing Observations = 47

Chart 21: Cross-Tabulation: Attitude and Age

Crosstabulation: AGE By ATTCAT

Count / Row Pct / Residual	ATTCAT.> 1.00. very neg.ative at.	2.00. negative attitud.	3.00. normal attitude	4.00. a.positive attitud.	5.00. very pos.itive at.	Row Total
AGE 1	27	31	13	32	13	116
	23.3%	26.7%	11.2%	27.6%	11.2%	14.9%
	5.1	8.3	-4.5	1.5	-10.4	
2	65	60	46	62	32	265
	24.5%	22.6%	17.4%	23.4%	12.1%	34.1%
	14.9	8.2	6.1	-7.6	-21.5	
3	29	24	23	38	32	146
	19.9%	16.4%	15.8%	26.0%	21.9%	18.8%
	1.4	-4.6	1.0	-.3	2.5	
4	14	18	11	32	24	99
	14.1%	18.2%	11.1%	32.3%	24.2%	12.7%
	-4.7	-1.4	-3.9	6.0	4.0	
5	5	11	14	27	34	91
	5.5%	12.1%	15.4%	29.7%	37.4%	11.7%
	-12.2	-6.8	.3	3.1	15.6	
6	7	8	10	13	22	60
	11.7%	13.3%	16.7%	21.7%	36.7%	7.7%
	-4.4	-3.7	1.0	-2.8	9.9	
Column Total	147	152	117	204	157	777
	18.9%	19.6%	15.1%	26.3%	20.2%	100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
68.17595	20	.0000	9.035	None

Number of Missing Observations = 41

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3. Cross-Tab Tidbits

The response to Item 67 regarding the importance (to success) of completing homework assignments on time IS independent of the student's demonstrated level of anxiety. See Chart 22.

Chart 22: Cross-Tabulation: Homework and Anxiety

Crosstabulation: SELF67 completing homework assignments on time By ANXCAT

ANXCAT.> Count / Row Pct / Residual	lowest anxiety 1.00	low anxiety 2.00	normal anxiety 3.00	high anxiety 4.00	highest anxiety 5.00	Row Total
SELF67 0 very unimportant	1	3	3	2	3	12
	8.3%	25.0%	25.0%	16.7%	25.0%	1.5%
	-1.2	.5	.6	-.4	.4	
1 fairly unimporta	3	3	2	1	4	13
	23.1%	23.1%	15.4%	7.7%	30.8%	1.6%
	.6	.3	-.6	-1.6	1.2	
2 undecided	5	4	3	6	8	26
	19.2%	15.4%	11.5%	23.1%	30.8%	3.2%
	.3	-1.3	-2.1	.7	2.5	
3 fairly important	37	30	35	28	30	160
	23.1%	18.8%	21.9%	17.5%	18.8%	19.9%
	7.9	-2.8	3.4	-4.4	-4.0	
4 very important	100	125	116	126	126	593
	16.9%	21.1%	19.6%	21.2%	21.2%	73.8%
	-7.7	3.3	-1.3	5.8	-.1	
Column Total	146	165	159	163	171	804
	18.2%	20.5%	19.8%	20.3%	21.3%	100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
10.21940	16	.8549	2.179	11 OF 25 (44.0%)

Number of Missing Observations = 14

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The response to the same Item 67 (noted on the previous page) is NOT independent of the student's attitude: Those who indicated that homework was unimportant demonstrated a negative attitude, while those who indicated that homework was important demonstrated a positive attitude. See Chart 23.

Chart 23: Cross-Tabulation: Homework and Attitude

Crosstabulation: SELF67 completing homework assignments on time By ATTCAT

ATTCAT.> / Count / Row Pct / Residual	.very neg.ative at. 1.00.	.negative attitud. 2.00.	.normal attitude 3.00.	a.positive attitud.itive at. 4.00.	.very pos. 5.00.	Row Total
SELF67 0 very unimportant	5	3	1	2	1	12
	41.7%	25.0%	8.3%	16.7%	8.3%	1.5%
	2.7	.7	-.8	-1.2	-1.4	
1 fairly unimporta	4	3	1	4	0	12
	33.3%	25.0%	8.3%	33.3%	.0%	1.5%
	1.7	.7	-.8	.8	-2.4	
2 undecided	11	4	2	7	2	26
	42.3%	15.4%	7.7%	26.9%	7.7%	3.2%
	6.1	-1.1	-1.9	.1	-3.2	
3 fairly important	38	34	29	33	27	161
	23.6%	21.1%	18.0%	20.5%	16.8%	20.0%
	7.5	2.5	4.9	-9.9	-5.1	
4 very important	94	113	87	168	130	592
	15.9%	19.1%	14.7%	28.4%	22.0%	73.7%
	-18.1	-2.7	-1.5	10.2	12.0	
Column Total	152	157	120	214	160	803
	18.9%	19.6%	14.9%	26.7%	19.9%	100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
31.17462	16	.0128	1.793	12 OF 25 (48.0%)

Number of Missing Observations = 15

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The anxiety scale and the attitude scale are NOT independent: The students who demonstrated a negative attitude also demonstrated significantly higher levels of anxiety than those students who demonstrated a positive attitude. See Chart 24.

Chart 24: Cross-Tabulation: Attitude and Anxiety

Crosstabulation: ATTCAT By ANXCAT

ANXCAT.> / ATTCAT	1.00 lowest anxiety	2.00 low anxiety	3.00 normal anxiety	4.00 high anxiety	5.00 highest anxiety	Row Total
1.00 very negative at	2	11	24	40	74	151
	1.3%	7.3%	15.9%	26.5%	49.0%	18.9%
	-25.6	-19.6	-6.0	9.6	41.7	
2.00 negative attitud	10	22	25	45	56	158
	6.3%	13.9%	15.8%	28.5%	35.4%	19.8%
	-18.9	-10.0	-6.4	13.2	22.2	
3.00 normal attitude	5	25	40	28	21	119
	4.2%	21.0%	33.6%	23.5%	17.6%	14.9%
	-16.7	.9	16.3	4.0	-4.5	
4.00 positive attitud	55	56	47	36	18	212
	25.9%	26.4%	22.2%	17.0%	8.5%	26.5%
	16.3	13.0	4.8	-6.7	-27.4	
5.00 very positive at	74	48	23	12	2	159
	46.5%	30.2%	14.5%	7.5%	1.3%	19.9%
	44.9	15.8	-8.6	-20.0	-32.0	
Column Total	146	162	159	161	171	799
	18.3%	20.3%	19.9%	20.2%	21.4%	100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
307.88883	16	.0000	21.745	None

Number of Missing Observations = 19

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C. LEARNING PREFERENCES AND PRACTICES RANKINGS BY SELECTED GROUPS

Ten items dealing with learning preferences and ten items dealing with learning practices were ranked based on the percentage of responses falling into the "'fairly' or 'very much' typical of me" range. The percentages were calculated for each of the twelve major groups defined in this study. The first rank contained the largest percentage of responses. For certain statements like "I rarely do homework," the percentage of responses in the 'not at all typical of me' and 'not very typical of me' was used. This is noted as a "reversal".

Charts 25 and 27 are summaries of the rankings of the items regarding learning preferences and learning practices for each of the twelve major groups within the population. The item number and percentage for each of the items ranked 1, 2 and 3 are recorded. When two or more items had the same percentage, both/all items are recorded.

Charts 26 and 28 reflect the frequency with which the items were ranked 1, 2 or 3 by each of the groups.

For your convenience, the full statement of each relevant survey item is listed below the chart. For all the survey statements, the full text of the Sierra College Algebra Student Survey is located in Appendix C.

Chart 25: Ranking of Learning Preference Items

RANK	MAJOR GROUP	Under-Prepared for College Math	Math A	Math D	Male	Female	Math Anxious	Math Re-entry	Transfer	Vocational	Disabled	Under-Represented	Single Parents
FIRST	Item Number	20	22	20	20	20	22	20	20	20	13	13	22
	Percent	84	85	83	81	87	91	87	84	96	93	83	87
SECOND	Item Number	22	20	13 22	22 13	22	20	15	22	13	22	20	20
	Percent	81	84	80	79	85	86	83	82	79	83	82	85
THIRD	Item Number	13	13	21	21	13	23	13	13 22	22	20	22	13
	Percent	78	76	69	66	77	79	79	80	75	80	79	82

There were twenty items in Section II of the SCASS. Items 12, 13, 14, 15, 18, 19, 20, 21, 22 and 23 pertain to learning preferences. If items within a group tied for the same rank, each item was counted.

The items listed by number in the table above, are listed with their description below:

13. I'm very interested in new ideas if they are useful.
15. I am not bored when a math teacher includes all the detailed steps when explaining a math problem (reversal).
20. I learn best when I see the teacher do examples on the board.
21. It helps me when the teacher provides an opportunity to practice new concepts in class.
22. My learning would improve if I had the opportunity to master one unit before moving on to the next.
23. I would find math easier if I could learn it at my own pace.

Chart 26: Frequencies for Learning Preferences

	RANKING		
ITEM	FIRST	SECOND	THIRD
13	2	3	6
15	0	1	0
20	7	4	1
21	0	0	2
22	3	6	3
23	0	0	1
Range of percentages: 69% to 96%			

Chart 27: Ranking of Learning Practices Items

RANK	MAJOR GROUP	Under-Prepared for College Math	Math A	Math D	Male	Female	Math Anxious	Math Re-entry	Transfer	Vocational	Disabled	Under-Represented	Single Parents
FIRST	Item Number	27	27	27	27	27	27	27	27	27	17	17	27
	Percent	75	94	96	93	95	95	96	97	97	95	93	93
SECOND	Item Number	24	24	24	24 26	24	28	24	26	24	24	24	24
	Percent	76	78	74	66	85	74	80	70	76	85	69	82
THIRD	Item Number	25	25 26	26	25	25	24	30	25	26	25	26	25
	Percent	68	69	67	58	73	71	76	65	74	82	68	75

There were twenty items in Section II of the SCASS. Items 11, 16, 17, 24, 25, 26, 27, 28, 29 AND 30 pertain to learning practices. If items within a group tied for the same rank, each item was counted.

The items listed by number in the table above, are listed with their description below:

17. I enjoy working with a group to solve difficult problems.
24. I almost always do homework for math classes (reversal).
25. Even when I don't like the material I always try hard.
26. I do not procrastinate when I have math homework (reversal).
27. Doing well is important to me.
28. I find math assignments more time consuming than homework in other subjects.
30. I usually read my textbooks as part of my study process for all my courses.

Chart 28: Frequencies for Learning Practices

	RANKING		
ITEM	FIRST	SECOND	THIRD
24	0	10	1
25	0	0	7
26	0	2	4
27	12	0	0
28	0	1	0
30	0	0	1
Range of percentages: 58% to 97%			

D. CONTRIBUTING FACTORS FOR SUCCESS IN LEARNING ALGEBRA

In the "Self-Description" section of the survey (Section V of the survey), the students were asked to rate thirteen items with regard to how important each of those items would be to their success in learning algebra: For each of twelve defined groups within the population, the thirteen items were ranked based on the percentage of responses for the groups in the "excellent" and "very good" range. with the first rank being the item with the highest percentage of responses by a group or groups. There were no reversal statements in this section.

Chart 29 reveals the outcomes of the rankings. Chart 30 reflects the frequencies with which the items were ranked 1st, 2nd or 3rd. Again, the full text of the relevant survey items is listed below the chart.

Chart 29: Ranking of Contributing Factors for Success

RANK	MAJOR GROUP	Under-Prepared for College Math	Math A	Math D	Male	Female	Math Anxious	Math Re-entry	Transfer	Vocational	Disabled	Under-Represented	Single Parents
FIRST	Item Number	62	62	62	62	57	62	57	62	57	57	62	59
	Percent	95	95	96	94	96	96	96	97	97	93	93	95
SECOND	Item Number	57	57	57	57	59	67	59	57	59	62	67	67
					67			62	59			57	
								67	61				
	Percent	94	93	93	92	93	93	94	95	96	92	91	93
THIRD	Item Number	67	57	59	59	61	61	61	61	62	61	61	62
												59	57
	Percent	93	91	92	90	90	91	88	91	92	88	86	92

There were thirteen items in the "Contributing Factors for Success" section of the SCASS, item numbers 57 through 69. If items within a group tied for the same rank, each item was counted.

The items listed by number in the table above, are listed with their description below:

57. Class attendance
59. Computation (adding, multiplying, etc.)
61. Style of instruction
62. Helpful instructor
67. Completing homework assignments on time

Chart 30: Frequencies of Contributing Factors for Success

	RANKING		
ITEM	FIRST	SECOND	THIRD
57	4	6	2
59	2	4	3
61	O	1	6
62	7	2	2
67	1	5	1

E. COMPARISON OF SURVEY ITEMS WITH A CARNEGIE REPORT

Items 77, 78 and 79 parallel questions asked of the professoriate in a technical report (the Carnegie Foundation, 1989). Their questions are:

1. The undergraduates with whom I have close contact are seriously under-prepared in basic skills.

2. On the whole, undergraduates are now more willing to work hard in their studies.

3. Most undergraduates at my institution only do enough to get by.

The table below shows the Carnegie Foundation's results in contrast to what Sierra College's algebra students said about each other. (See Section IV of the SCASS).

	AGREE	NEUTRAL	DISAGREE	
C.R.* Item 1	**Under-Prepared in Basic Skills**			
	75%	9%	15%	All Faculty
	85%	7%	8%	Two-Year Faculty
	80%	10%	10%	Math Faculty
SCASS Item 77	37%	34% Undecided	30%	Sierra Students
C.R. Item 2	**Willing to Work Hard**			
	24%	21%	55%	All Faculty
	21%	20%	59%	Two-Year Faculty
	17%	26%	58%	Math Faculty
SCASS Item 78	46%	38% Undecided	16%	Sierra Students
C.R. Item 3	**Students Do Only Enough To Get By**			
	55%	12%	33%	All Faculty
	63%	11%	27%	Two-Year Faculty
	55%	20%	25%	Math Faculty
SCASS Item 79	43%	36% Undecided	21%	Sierra Students

*Carnegie Report

V. CONCLUSIONS

1. A significant number of students enrolled in Sierra College's algebra classes are members of the groups defined for this study.

   Suggestions for future research: Among these groups, or other groups yet to be characterized, may lie the "at risk" group of students. This "at risk" group contains most of the 50% of algebra students who disappear, withdraw or fail. More research must be focused on how to identify this group of students so intervention can take place before another failure can occur.

2. The assumption of many teachers is that older "returning" students suffer more math anxiety than the younger students. The results show that based on the SCASS scale, not only is the assumption probably false, but that the trends observed show that the younger students register higher levels of anxiety and more negative attitudes about math than the older students. Other trends are also noted in the report and many remain yet undiscovered.

   Suggestions for future research: Extend this study and continue to explore the scales created by this study. Include course grade, GPA, along with withdrawal and failure groups as additional parameters for identification and correlation studies. The goal is to determine the characteristics of the unsuccessful students, an alarming large 50% of all enrolled algebra students. These results can then be utilized by counseling to "refer" students to special algebra classes that can try to intervene in the existing cycle of failure.

3. Results of the Learning Preferences and Practices summary reveals that algebra students have rather strong and unanimous feelings regarding the SCASS items. Only sixteen of the 77 rankings (21%) were less than 75%.

   A startling observation is that these students reveal practices that do not correspond to reality as perceived by their instructors.

   Example 1: Item 24, "I almost always do my homework" (reverse of Item 24), appeared eleven times for the twelve groups and ranked second or third with percentage rankings of 68 to 85 percent. Thus, students are aware of, and believed, they would engage in this practice. Also, Charts 22 and 23 show anxiety level and importance of homework are independent whereas attitude and importance of homework show a trend. The trend is that as homework is believed to be "more important" so is the proportion of those showing a positive attitude about math.

   Suggestions for future research: This information is contrary to what faculty perceive. The feeling on the part of most faculty is that students who are not successful don't do homework; and that

failure to do homework is a large part of the reason that students are unsuccessful. Are teachers wrong? Is homework, as presently defined, not helpful to success for this group of students? Or are students not doing their homework because they cannot complete it?

Example 2: Items 20 and 22 were cited most often as learning preference regarding algebra. Item 20, "I learn best when I see the teacher do examples on the board," ranked first or second for eleven of the twelve groups. Item 22, "My learning would improve if I had the opportunity to master one unit before moving on to the next," ranked first or second by nine of the twelve groups. Item 20 indicates that the best way for a large number of student to learn is to see instructors model solution methods by doing examples on the board. Item 22 indicates that a large number of students believe they would benefit from the availability of classes that offer mastery learning--mastery of a given concept before moving on to a new concept. In addition, almost 30% of the students say they get discouraged because algebra doesn't make sense, 38% worry that they will fail math, and 30% revealed that they do not learn best by listening (items 32, 33 and 18 respectively).

The above information provides a strong indication that a flexible learning environment for at least 30% of these students could make a difference. Energy, time, research and dollars must be invested to make this possible.

Clearly the students do not know the best way for them to learn: "listening" and "seeing" (the elements of the traditional lecture format) has already failed to help a significant proportion to master algebra. Furthermore, 48% of these same students rated themselves as "poor" or "fair" algebra students (Item 54).

Suggestions for future research: Students don't know what helps them learn best and, sadly, most faculty don't know either. It would be of great benefit for faculty to experiment with alternative teaching strategies and environments, and try to match them to the needs of the student. The ranking of "mastery learning" by the twelve major groups calls for a style other than teacher paced for some students.

4. With regard to elements which contribute to success in algebra, Item 62, "helpful teacher," was ranked first, second or third by eleven out of twelve groups, all with percentages above 90%.

Item 57, "Class attendance," was ranked first, second or third by twelve out of twelve groups, again with all percentages above 90%. Since absenteeism is a problem among algebra students, clearly the action on the part of a large number of students does not match with their indicated belief that class attendance is an important element contributing to their success in algebra.

Suggestions for future research: What can be done to make algebra a more enticing "distraction" than those forces which persuade a student to cut class? What is a helpful teacher? This survey indicates a teacher which does "examples" and uses "mastery learning." This is a start, but more exploration is indicated.

Based on the above information, a general conclusion can be made: If given the exposure to alternate styles of instruction, i.e., a flexible teaching environment, these students may be able to complete algebra and "matriculate" in a timely manner. A study of this type of program is the purpose of the "Fund for Instructional Improvement" grant submitted by E.K. Whittlesy of Sierra College and funded by the Chancellor's Office of the California Community Colleges.

5. When asked to assess one another (items 77, 78, and 79), algebra students were a bit shy. Close to one third of the students did not want to render judgements on their peers regarding "under-preparation in basic skills," "willingness to work hard," or "doing only enough to get by."

College faculty (The Carnegie Foundation, 1989) had no problem rating students in these categories. With regard to "willingness to work hard," 21% of the two-year faculty polled, vs. 46% of the SCASS student respondents indicated that students/peers were willing to work hard.

The faculty and algebra students were most alike in their assessment of "students doing just enough to get by": 55% of the math faculty and 43% of the students polled agreed with this statement.

When assessing the degree to which students are prepared in basic skills, eighty percent of the math faculty agreed that undergraduates are seriously under-prepared in basic skills, (one of these basic skills is algebra) compared to 37% for Sierra College students (only 30% disagreed).

Suggestions for future research: What can math teachers do? Agitate, organize and lead a "Math Revolution"! Some have already begun the fight! To find out more about how to join the revolution see Everybody Counts (Mathematical Sciences Education Board, 1989), Reshaping School Mathematics (Mathematical Sciences Education Board, 1990), Tools for Learning (Gall, 1990) and A Curriculum in Flux (Davis, 1989).

VI. APPENDICES

APPENDIX A

ACKNOWLEDGEMENTS

APPENDIX A

ACKNOWLEDGEMENTS

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APPENDIX B

SELECTED BIBLIOGRAPHY

APPENDIX B

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APPENDIX C

SIERRA COLLEGE ALGEBRA STUDENT SURVEY
WITH INSTRUCTIONS

1990/91 NORCAL
SMALL RESEARCH GRANT PROGRAM
(for a Proposed Research Project)

APPLICATION FORM
(You may use a word processor in place of this form.)

Person Submitting Project: Elaine Whittlesy

Project Title: Algebra Student Survey

College: Sierra College Phone: (916)624-3333

Address: 5000 Rocklin Road, Rocklin, CA 95677

PROJECT APPROVALS (Signatures)

Applicant (Project Director) Date

Chief Administrative Officer (or designee) Date

1. What is the purpose of the research project? State the question(s) your research is intended to answer, and if you have developed any hypotheses, state them.

The project is to design and administer a survey to Sierra College's elementary and intermediate algebra students. The purpose is to determine the various types of students enrolled in algebra classes and explore their attitudes about learning algebra. (The follow-up would be to track them and determine their success rates.) The types of students the survey will identify include the: math-anxious, under-prepared, reentry, under-represented, vocational, disabled, transfer and the single parent. In an effort to individualize and improve instruction in algebra, one needs to know the attitudes of those enrolled and their student groupings. Given a 50% success rate in algebra statewide, some innovations are needed.

2. What is known currently about this research topic? Briefly summarize what you know from personal experience or previous research, and if appropriate, describe any plan for reviewing research literature.

At registration, Sierra College students give very little information about themselves and nothing about their attitudes. Attitudes about algebra play an important role in how students react to a given method of instruction. For example, some studies indicate that a returning student (age 21 or older) responds better to small group lecture and cooperative learning approaches than to a teacher-paced method of instruction. Therefore, a search of the literature will be required to take advantage of questions which have already been drafted and piloted. For example, some work has already been done in measuring the level of math anxiety suffered by students.

3. How do you plan to conduct your research? Include brief descriptions of the participants, treatments, measurement methods and plan for analysis of the results. Mention any statistics you plan to use, even if they are simple (e.g. averages or percentages).

We plan to construct, pilot, and administer the survey during the Fall 1990 and Spring 1991 semesters and identify the various groups of students with certain attitudes. The analysis will include percentages and any other informative statistic based on the collected data. Sierra College enrollment in algebra is approximately 1,200 students per semester, and it is our hope to pilot the survey and administer it to all 1,200 students.

4. How will the anticipated research results be used by you and your institution?

The research results will be examined, and based on the results, we may be able to provide special sections of algebra with more appropriate specialized methods of instruction. Also, Sierra College will be better informed about their algebra student population and can direct student support services more effectively. The results of the survey will be made available to other community colleges for their use. The survey itself can also be shared.

5. How do you plan to spend the grant funds? (Budget categories are included below.)

The costs will include time for the consultants, clerical assistance and materials (scantrons and survey reproduction costs).

SIERRA COLLEGE

• 5000 Rocklin Road • Rocklin CA 95677 • Tel.916-624-3333 •

Memo

Date: Jan 16, 1991

To: Mathematics Instructors

From: Elaine Whittlesey

Subject: Algebra Student Survey

Your assistance is needed. Attached is a copy of a funded grant proposal. It will explain the purpose of the survey. I hope that you will administer for me in your algebra classes. I wish to catch as many students as possible; you can include students who wish to add your class too.

You will receive the surveys and scantron forms along with some #2 pencils very soon. Please return forms and surveys (and pencils) by mail or to my office W-109B.

Directions will be included for you in the survey packet. It will probably take 30-35 minutes. This includes distribution and direction time.

Thankyou for your cooperation. I hope we can get some information about our students that will help us meet their needs. I will see that you get a copy of the final report.

BEST COPY AVAILABLE

DIRECTIONS FOR THE ALGEBRA STUDENT SURVEY

Dear Mathematics Instructor:

Thank you for helping with this effort to survey our algebra students. Your critical eye would be appreciated; this is the first time this survey has been used so improvements will be welcomed for the next time this survey is administered.

The students must be told how to fill out the scantron form. Attached is a copy of the form indicating where to enter the following vital information:

1. sex
2. age (in columns for year of birth)
3. social security number (student ID number), columns A-I
4. math class using the code: Math A = 1 or Math D = 2 in column K
5. questions #84 and #85 are optional as they deal with ethnic background. We hope that they will give us this information; each individual's responses will be held in confidence.

There are 100 questions to respond to in the right hand side and the back of the machine scored answer sheet. When piloted the survey took about 25 mimutes to complete. Also students wishing to add your class should be encouraged to participate.

If for some reason a student does not have access to a #2 pencil, have them fill the scantron with what ever they have and mark it with the word "ink". We will take care of their form.

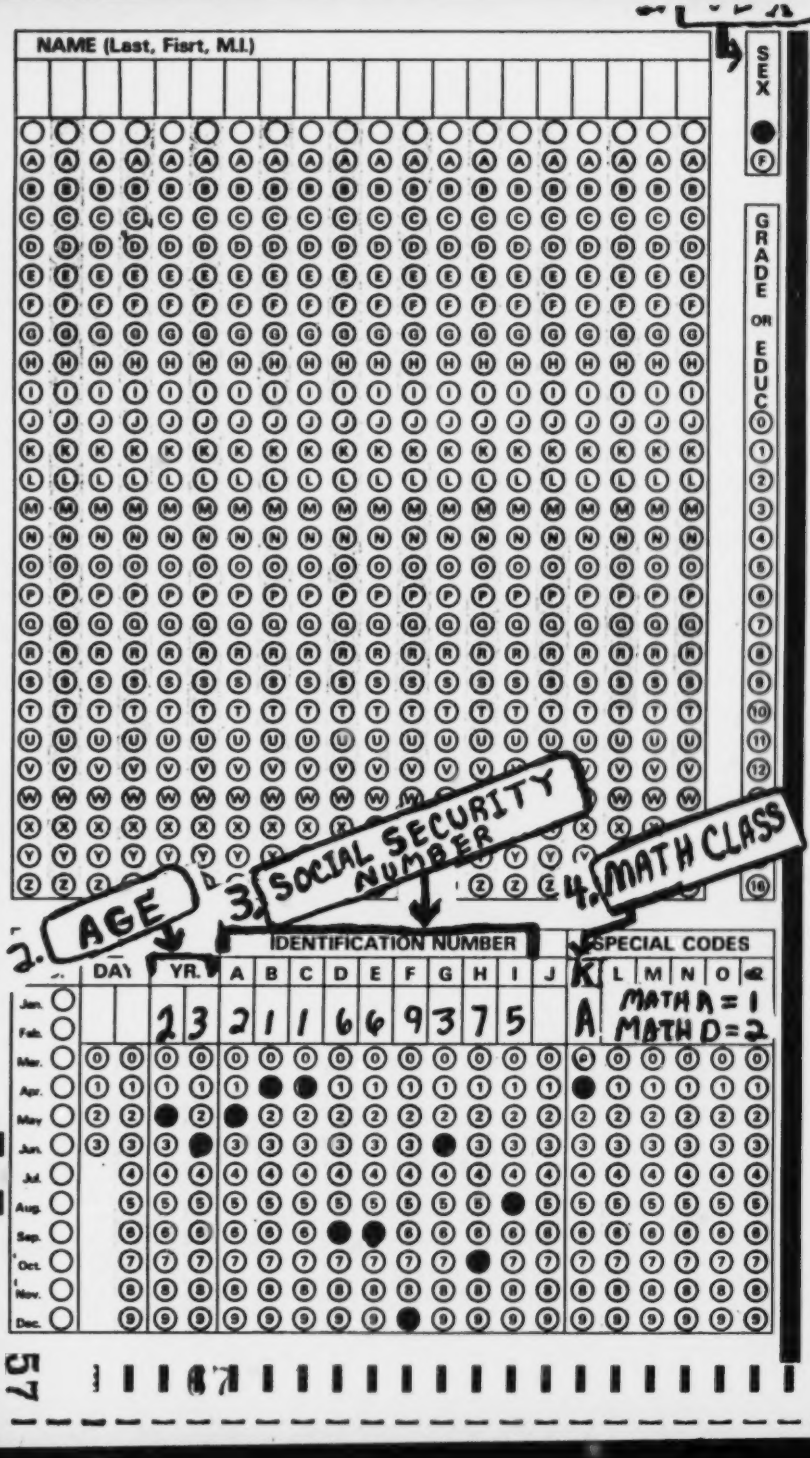
Please return the surveys, scantrons and pencils to me in W 109-B or by the school mail. Be sure you indicate your name and if it was a Math A or a Math D class.

Thank you so much for your assistance in this study. I will see that you get a copy of the final report.

Sincerely,

Elaine Whittlesy

Elaine


NAME (Last, Fisrt, M.I.)
SEX
F
GRADE OR EDUC
2. AGE
3. SOCIAL SECURITY NUMBER
4. MATH CLASS
IDENTIFICATION NUMBER
SPECIAL CODES
DAY
YR.
A B C D E F G H I J
K L M N O
MATH A = 1
MATH D = 2
Jan.
Feb.
Mar.
Apr.
May
Jun.
Jul.
Aug.
Sep.
Oct.
Nov.
Dec.
2 3 2 1 1 6 6 9 3 7 5
A

SIDE 1

GENERAL PURPOSE - NCS® - ANSWER SHEET

FOR USE WITH ALL NCS SENTRY ™ OPTICAL MARK READING SYSTEMS

SEE IMPORTANT MARKING INSTRUCTIONS ON SIDE 2

	A	B	C	D	E	F	G	H	I	J
1	0	1	2	3	4	5	6	7	8	9
2	0	1	2	3	4	5	6	7	8	9
3	0	1	2	3	4	5	6	7	8	9
4	0	1	2	3	4	5	6	7	8	9
5	0	1	2	3	4	5	6	7	8	9
6	0	1	2	3	4	5	6	7	8	9
7	0	1	2	3	4	5	6	7	8	9
8	0	1	2	3	4	5	6	7	8	9
9	0	1	2	3	4	5	6	7	8	9
10	0	1	2	3	4	5	6	7	8	9
11	0	1	2	3	4	5	6	7	8	9
12	0	1	2	3	4	5	6	7	8	9
13	0	1	2	3	4	5	6	7	8	9
14	0	1	2	3	4	5	6	7	8	9
15	0	1	2	3	4	5	6	7	8	9
16	0	1	2	3	4	5	6	7	8	9
17	0	1	2	3	4	5	6	7	8	9
18	0	1	2	3	4	5	6	7	8	9
19	0	1	2	3	4	5	6	7	8	9
20	0	1	2	3	4	5	6	7	8	9
21	0	1	2	3	4	5	6	7	8	9
22	0	1	2	3	4	5	6	7	8	9
23	0	1	2	3	4	5	6	7	8	9
24	0	1	2	3	4	5	6	7	8	9
25	0	1	2	3	4	5	6	7	8	9
26	0	1	2	3	4	5	6	7	8	9
27	0	1	2	3	4	5	6	7	8	9
28	0	1	2	3	4	5	6	7	8	9
29	0	1	2	3	4	5	6	7	8	9
30	0	1	2	3	4	5	6	7	8	9

	A	B	C	D	E	F	G	H	I	J
31	0	1	2	3	4	5	6	7	8	9
32	0	1	2	3	4	5	6	7	8	9
33	0	1	2	3	4	5	6	7	8	9
34	0	1	2	3	4	5	6	7	8	9
35	0	1	2	3	4	5	6	7	8	9
36	0	1	2	3	4	5	6	7	8	9
37	0	1	2	3	4	5	6	7	8	9
38	0	1	2	3	4	5	6	7	8	9
39	0	1	2	3	4	5	6	7	8	9
40	0	1	2	3	4	5	6	7	8	9
41	0	1	2	3	4	5	6	7	8	9
42	0	1	2	3	4	5	6	7	8	9
43	0	1	2	3	4	5	6	7	8	9
44	0	1	2	3	4	5	6	7	8	9
45	0	1	2	3	4	5	6	7	8	9
46	0	1	2	3	4	5	6	7	8	9
47	0	1	2	3	4	5	6	7	8	9
48	0	1	2	3	4	5	6	7	8	9
49	0	1	2	3	4	5	6	7	8	9
50	0	1	2	3	4	5	6	7	8	9
51	0	1	2	3	4	5	6	7	8	9
52	0	1	2	3	4	5	6	7	8	9
53	0	1	2	3	4	5	6	7	8	9
54	0	1	2	3	4	5	6	7	8	9
55	0	1	2	3	4	5	6	7	8	9
56	0	1	2	3	4	5	6	7	8	9
57	0	1	2	3	4	5	6	7	8	9
58	0	1	2	3	4	5	6	7	8	9
59	0	1	2	3	4	5	6	7	8	9
60	0	1	2	3	4	5	6	7	8	9

Sierra College

ALGEBRA STUDENT SURVEY

(THIS IS NOT A MATH TEST!)

Prepared by:
Elaine Whittlesy, Mathematics Department

Aided by:
Tracy Rusch and the Algebra Students of Sierra College

With the Cooperation of:
The Sierra College Mathematics Instructors

****

Purpose:

This survey is designed to help the Math Department improve the algebra programs.

Instructions:

Use a #2 pencil to darken the circle under the letter on the machine scored answer sheet which matches the letter of your response. There are 100 questions which should take only 20 to 25 minutes to answer. Please answer all 100 questions.

Try to answer the questions according to your true response. Work as quickly as you can without being careless. There are no right or wrong answers. Your answers will be held in confidence and will have absolutely no effect on your grade.

THANK YOU FOR PARTICIPATING!

I. WHY ARE YOU HERE?

Rate how important each of the following statements were to <u>your decision</u> to enroll in this math class.

Scale:	A Very <u>Unimportant</u>	B Fairly <u>Unimportant</u>	C Undecided	D Fairly Important	E Very Important

1. Requirement for my college program	A B C D E
2. To improve my math skills	A B C D E
3. To improve my confidence in math	A B C D E
4. To meet job requirements	A B C D E
5. To improve employment opportunities	A B C D E
6. My parents encouraged me to take a math class	A B C D E
7. Counselors and/or instructors encouraged me to make a math class	A B C D E
8. I took this class in high school but I need a refresher	A B C D E
9. I am changing careers	A B C D E
10. I have had algebra but due to an accident (physical trauma) I must relearn it.	A B C D E

II. LEARNING PREFERENCES AND PRACTICES

Rate how well each of the following statements describes you.

Scale:	A	B	C	D	E
	Not At All Typical Of Me	Not Very Typical Of Me	Somewhat Typical Of Me	Fairly Typical Of Me	Very Much Typical Of Me

11. I must understand why something is important before I can learn it. A B C D E

12. I like to experiment and learn by trial and error. A B C D E

13. I'm very interested in new ideas if they are useful. A B C D E

14. I learn best when I study by myself. A B C D E

15. I get bored when a math teacher includes all the detailed steps when explaining a math problem. A B C D E

16. I learn math more easily when I work with a study partner. A B C D E

17. I enjoy working with a group to solve difficult problems. A B C D E

18. I learn best by listening. A B C D E

19. I need to learn how to take good math notes. A B C D E

20. I learn best when I see the teacher do examples on the board. A B C D E

21. It helps me when the teacher provides an opportunity to practice new concepts in class. A B C D E

22. My learning would improve if I had the opportunity to master one unit before moving on to the next. A B C D E

23. I would find math easier if I could learn it at my own pace. A B C D E

24. I rarely do homework for math classes. A B C D E

25. Even when I don't like the material I always try hard. A B C D E

26. I look for other things to do when I have math homework. A B C D E

27. Doing well is important to me. A B C D E

28. I find math assignments more time consuming than homework in other subjects. A B C D E

29. I find the explanations in my math textbooks helpful. A B C D E

30. I usually read my textbooks as part of my study process for all my courses. A B C D E

III. YOUR MATH REFLEX

Rate how well each of the following statements describes you.

Scale:	A	B	C	D	E
	Not At All Typical Of Me	Not Very Typical Of Me	Somewhat Typical Of Me	Fairly Typical Of Me	Very Much Typical Of Me

31.	I get shaky and feel uncomfortable when attempting math problems.	A B C D E
32.	I worry that I will fail math classes.	A B C D E
33.	I get discouraged because algebra doesn't make sense to me.	A B C D E
34.	I rarely get nervous when taking tests in <u>any</u> of my classes.	A B C D E
35.	I get more nervous taking <u>math tests</u> than any other tests.	A B C D E
36.	I can do my math homework but I get nervous and confused when I take the test.	A B C D E
37.	I take advantage of opportunities to use math.	A B C D E
38.	I don't like to study math.	A B C D E
39.	I was successful in math until I started <u>algebra</u>.	A B C D E
40.	I feel quite confident and secure about my ability to do algebra.	A B C D E
41.	I don't know how to study math.	A B C D E

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IV. ATTITUDES ABOUT MATH

Rate how well each of the following statements describes you.

Scale:	A	B	C	D	E
	Not At All Typical Of Me	Not Very Typical Of Me	Somewhat Typical Of Me	Fairly Typical Of Me	Very Much Typical Of Me

42.	I hardly ever choose doing school work over going out with friends.	A B C D E
43.	I enjoy mathematics.	A B C D E
44.	Math is not important for my future career.	A B C D E
45.	I can learn math if I spend time working on problems.	A B C D E
46.	I can learn math if I have help when I get stuck.	A B C D E
47.	I dislike working with numbers.	A B C D E
48.	I want to know <u>everything</u> about what I'm learning.	A B C D E
49.	Algebra scares me.	A B C D E
50.	When I have difficulty understanding math I find <u>help</u>.	A B C D E
51.	I can understand math if I have a <u>good</u> teacher.	A B C D E
52.	I organize my study time well.	A B C D E

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V. SELF-DESCRIPTION

Rate yourself:

Scale:	A	B	C	D	E	F
	Poor	Fair	Good	Very Good	Excellent	Don't Know

53. What kind of high school student were you?	A B C D E F
54. Compared to other students, how do you rate your ability to use algebra to solve problems?	A B C D E F
55. What kind of a math student are you?	A B C D E F
56. What kind of a college student do you think you are or will be?	A B C D E F

Rate how important you believe each of the following will be to your success in your algebra class.

Scale:	A	B	C	D	E
	Very Unimportant	Fairly Unimportant	Undecided	Fairly Important	Very Important

57. Class attendance	A B C D E
58. Reading	A B C D E
59. Computation (adding, multiplying, etc.)	A B C D E
60. Hand held calculator	A B C D E
61. Style of instruction	A B C D E
62. Helpful teacher	A B C D E
63. Encouragement from friends	A B C D E
64. Writing out all steps on assigned problems in an organized way	A B C D E
65. Encouragement from family	A B C D E
66. Help outside of class	A B C D E
67. Completing homework assignments on time	A B C D E
68. Practice tests	A B C D E
69. Assigned seating	A B C D E

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VI. WORLD VIEW

Rate the degree to which you agree with each of the following statements.

Scale:	A	B	C	D	E
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

70. The work force of the future must be flexible and capable of lifelong learning. A B C D E

71. Mathematics is an increasingly vital tool for survival in a technological society. A B C D E

72. Mathematics is a set of rules and procedures concerning numbers. A B C D E

73. Mathematics involves experiments, verification, and research which looks for patterns and connections. A B C D E

74. Today, students have few opportunities to build skills of cooperation, compromise and teamwork. A B C D E

75. Men and women are equally capable in mathematics. A B C D E

76. Today's students are being deprived of needed resources to help them learn mathematics. A B C D E

77. Most beginning college students with whom I have close contact are seriously under-prepared in Basic Skills (reading, writing and math). A B C D E

78. Most beginning college students with whom I have contact are more than willing to work hard in their studies. A B C D E

79. Most beginning college students only do enough school work to get by. A B C D E

80. Women can do mathematics better than men. A B C D E

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VII. BACKGROUND INFORMATION

Choose only one answer for each of the following questions.

81. What is your high school education?

A. High school diploma
B. G.E.D.
C. Not a high school graduate
D. Foreign secondary school diploma
E. Other

82. What is your previous college experience?

A. None
B. Have attended college but no degree or certificate
C. Vocational or technical certificate
D. AA or AS degree
E. Bachelors degree
F. Masters degree
G. Other

83. What is your student classification? (Transfer means "intending to go to a four year school")

A. High school student taking classes at Sierra
B. First semester college student (not transfer)
C. Sierra College student with at least one semester at Sierra (not transfer)
D. Transfer student, first semester at Sierra
E. Transfer student with at least one prior semester at Sierra
F. Other
G. Don't Know

84. What is your ethnic heritage?

A. American Indian or Alaskan
B. Asian or Pacific Islander
C. African American
D. Caucasian
E. Hispanic
F. Filipino
G. Other Non-Caucasian
H. Other

85. What is your first language?

A. English
B. Spanish
C. Asian (Chinese, Japanese, Hmong, etc.)
D. European (French, German, etc.)
E. Other

86. What is your family status?

A. Single, living with parents
B. Single, self-supporting
C. Single parent
D. Married, no children
E. Married, one or more children
F. Other

87. How many class units do you plan to take this semester?

A. 1 to 2 units
B. 3 to 5 units
C. 6 to 8 units
D. 9 to 11 units
E. 12 to 14 units
F. 15 or more units

88. How many hours per week (paid employment) do you plan to work during the semester?

A. None
B. 1 to 9 hours
C. 10 to 19 hours
D. 20 to 29 hours
E. 30 to 39 hours
F. 40 or more hours

89. Do you receive support or counseling services from the Enabling Center on campus?

A. yes B. no

90. Do you have a medically verifiable disability?

A. yes B. no

91. If you answered yes to question 90, please indicate the category of your disability.

A. Visual
B. Mobility/Orthopedic
C. Hearing
D. Learning
E. Other

92. Are you currently receiving financial aid?

A. Yes B. No

93. If your last math class was taken in high school, which one was it?

A. Business or Consumer Math
B. Pre-Algebra
C. Algebra I
D. Geometry
E. Algebra II
F. Algebra II with Trigonometry
G. Other

94. If your last math class was taken in college, which one was it?

A. Advanced Arithmetic (SD582 or SKDL82 at Sierra College)
B. Pre-Algebra (SD583 at Sierra College)
C. Business Math
D. Elementary Algebra (Math A at Sierra College)
E. Intermediate Algebra (Math D at Sierra College)
F. Geometry (Math B at Sierra College)
G. Other

95. How many years has it been since you enrolled in a math class?

A. One-half year (last semester)
B. 1 to 2 years
C. 2 to 4 years
D. 5 to 9 years
E. 10 to 19 years
F. 20 or more years

96. Did you take a Sierra College Math Assessment test given by the Sierra College Assessment and Counselling Center?

A. Yes B. No

97. How long has it been since you were enrolled in school (high school or college)?

A. Last semester
B. 1 to 2 years
C. 2 to 4 years
D. 5 to 9 years
E. 10 to 19 years
F. 20 or more years

98. What type of program are you pursuing?

A. Vocational/Technical
B. Academic/Transfer
C. Personal Interest/Enrichment
D. Other
E. Don't Know

99. What type of degree are you pursuing?

A. High School Diploma
B. Improve employment opportunities, no degree desired
C. Personal enrichment, no degree desired
D. Vocational Certificate
E. An AA or AS
F. An AA or AS and then a Bachelors
G. Bachelors degree without an AA or AS
H. Other
I. Don't Know/Undecided

100. In which <u>area</u> do you think your strongest interests lie? (Choose one)

A. Humanities/Fine Arts/English
B. Social Sciences
C. Math/Natural Sciences/Engineering
D. Vocational/Technical/Occupational
E. Communications/Media
F. Business
G. Teaching
H. Computer Science
I. General Studies/Liberal Arts
J. Undecided

NAME (Last, First, M.I.)

SEX (M) (F)

GRADE OR EDUC
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

BIRTH DATE			IDENTIFICATION NUMBER										SPECIAL CODES					
MO	DAY	YR	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Jan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Feb	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mar	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Apr	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
May		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Jun		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Jul		6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Aug		7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Sep		8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Oct		9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Nov																		
Dec																		

64

80

SIDE 1

GENERAL PURPOSE - NCS® - ANSWER SHEET

FOR USE WITH ALL NCS SENTRY™ OPTICAL MARK READING SYSTEMS
SEE IMPORTANT MARKING INSTRUCTIONS ON SIDE 2

	A	B	C	D	E	F	G	H	I	J
1	0	1	2	3	4	5	6	7	8	9
2	0	1	2	3	4	5	6	7	8	9
3	0	1	2	3	4	5	6	7	8	9
4	0	1	2	3	4	5	6	7	8	9
5	0	1	2	3	4	5	6	7	8	9
6	0	1	2	3	4	5	6	7	8	9
7	0	1	2	3	4	5	6	7	8	9
8	0	1	2	3	4	5	6	7	8	9
9	0	1	2	3	4	5	6	7	8	9
10	0	1	2	3	4	5	6	7	8	9
11	0	1	2	3	4	5	6	7	8	9
12	0	1	2	3	4	5	6	7	8	9
13	0	1	2	3	4	5	6	7	8	9
14	0	1	2	3	4	5	6	7	8	9
15	0	1	2	3	4	5	6	7	8	9
16	0	1	2	3	4	5	6	7	8	9
17	0	1	2	3	4	5	6	7	8	9
18	0	1	2	3	4	5	6	7	8	9
19	0	1	2	3	4	5	6	7	8	9
20	0	1	2	3	4	5	6	7	8	9
21	0	1	2	3	4	5	6	7	8	9
22	0	1	2	3	4	5	6	7	8	9
23	0	1	2	3	4	5	6	7	8	9
24	0	1	2	3	4	5	6	7	8	9
25	0	1	2	3	4	5	6	7	8	9
26	0	1	2	3	4	5	6	7	8	9
27	0	1	2	3	4	5	6	7	8	9
28	0	1	2	3	4	5	6	7	8	9
29	0	1	2	3	4	5	6	7	8	9
30	0	1	2	3	4	5	6	7	8	9

	A	B	C	D	E	F	G	H	I	J
31	0	1	2	3	4	5	6	7	8	9
32	0	1	2	3	4	5	6	7	8	9
33	0	1	2	3	4	5	6	7	8	9
34	0	1	2	3	4	5	6	7	8	9
35	0	1	2	3	4	5	6	7	8	9
36	0	1	2	3	4	5	6	7	8	9
37	0	1	2	3	4	5	6	7	8	9
38	0	1	2	3	4	5	6	7	8	9
39	0	1	2	3	4	5	6	7	8	9
40	0	1	2	3	4	5	6	7	8	9
41	0	1	2	3	4	5	6	7	8	9
42	0	1	2	3	4	5	6	7	8	9
43	0	1	2	3	4	5	6	7	8	9
44	0	1	2	3	4	5	6	7	8	9
45	0	1	2	3	4	5	6	7	8	9
46	0	1	2	3	4	5	6	7	8	9
47	0	1	2	3	4	5	6	7	8	9
48	0	1	2	3	4	5	6	7	8	9
49	0	1	2	3	4	5	6	7	8	9
50	0	1	2	3	4	5	6	7	8	9
51	0	1	2	3	4	5	6	7	8	9
52	0	1	2	3	4	5	6	7	8	9
53	0	1	2	3	4	5	6	7	8	9
54	0	1	2	3	4	5	6	7	8	9
55	0	1	2	3	4	5	6	7	8	9
56	0	1	2	3	4	5	6	7	8	9
57	0	1	2	3	4	5	6	7	8	9
58	0	1	2	3	4	5	6	7	8	9
59	0	1	2	3	4	5	6	7	8	9
60	0	1	2	3	4	5	6	7	8	9

SIDE 2

64 A

	A	B	C	D	E	F	G	H	I	J
61	0	1	2	3	4	5	6	7	8	9
62	0	1	2	3	4	5	6	7	8	9
63	0	1	2	3	4	5	6	7	8	9
64	0	1	2	3	4	5	6	7	8	9
65	0	1	2	3	4	5	6	7	8	9
66	0	1	2	3	4	5	6	7	8	9
67	0	1	2	3	4	5	6	7	8	9
68	0	1	2	3	4	5	6	7	8	9
69	0	1	2	3	4	5	6	7	8	9
70	0	1	2	3	4	5	6	7	8	9

	A	B	C	D	E	F	G	H	I	J
71	0	1	2	3	4	5	6	7	8	9
72	0	1	2	3	4	5	6	7	8	9
73	0	1	2	3	4	5	6	7	8	9
74	0	1	2	3	4	5	6	7	8	9
75	0	1	2	3	4	5	6	7	8	9
76	0	1	2	3	4	5	6	7	8	9
77	0	1	2	3	4	5	6	7	8	9
78	0	1	2	3	4	5	6	7	8	9
79	0	1	2	3	4	5	6	7	8	9
80	0	1	2	3	4	5	6	7	8	9

	A	B	C	D	E	F	G	H	I	J
81	0	1	2	3	4	5	6	7	8	9
82	0	1	2	3	4	5	6	7	8	9
83	0	1	2	3	4	5	6	7	8	9
84	0	1	2	3	4	5	6	7	8	9
85	0	1	2	3	4	5	6	7	8	9
86	0	1	2	3	4	5	6	7	8	9
87	0	1	2	3	4	5	6	7	8	9
88	0	1	2	3	4	5	6	7	8	9
89	0	1	2	3	4	5	6	7	8	9
90	0	1	2	3	4	5	6	7	8	9

	A	B	C	D	E	F	G	H	I	J
91	0	1	2	3	4	5	6	7	8	9
92	0	1	2	3	4	5	6	7	8	9
93	0	1	2	3	4	5	6	7	8	9
94	0	1	2	3	4	5	6	7	8	9
95	0	1	2	3	4	5	6	7	8	9
96	0	1	2	3	4	5	6	7	8	9
97	0	1	2	3	4	5	6	7	8	9
98	0	1	2	3	4	5	6	7	8	9
99	0	1	2	3	4	5	6	7	8	9
100	0	1	2	3	4	5	6	7	8	9

82

	A	B	C	D	E	F	G	H	I	J
101	0	1	2	3	4	5	6	7	8	9
102	0	1	2	3	4	5	6	7	8	9
103	0	1	2	3	4	5	6	7	8	9
104	0	1	2	3	4	5	6	7	8	9
105	0	1	2	3	4	5	6	7	8	9
106	0	1	2	3	4	5	6	7	8	9
107	0	1	2	3	4	5	6	7	8	9
108	0	1	2	3	4	5	6	7	8	9
109	0	1	2	3	4	5	6	7	8	9
110	0	1	2	3	4	5	6	7	8	9

	A	B	C	D	E	F	G	H	I	J
111	0	1	2	3	4	5	6	7	8	9
112	0	1	2	3	4	5	6	7	8	9
113	0	1	2	3	4	5	6	7	8	9
114	0	1	2	3	4	5	6	7	8	9
115	0	1	2	3	4	5	6	7	8	9
116	0	1	2	3	4	5	6	7	8	9
117	0	1	2	3	4	5	6	7	8	9
118	0	1	2	3	4	5	6	7	8	9
119	0	1	2	3	4	5	6	7	8	9
120	0	1	2	3	4	5	6	7	8	9

GENERAL PURPOSE
NCS®
ANSWER SHEET
form no. 4887

FOR USE WITH ALL NCS SENTRY ™ OPTICAL MARK READING SYSTEMS

EXAMPLES

WRONG
1 ① ⊗ ③ ④ ⑤

WRONG
2 ① ② ✓ ④ ⑤

WRONG
3 ① ② ③ ● ⑤

RIGHT
4 ① ② ③ ● ⑤

IMPORTANT DIRECTIONS FOR MARKING ANSWERS

- Use #2 pencil only.
- Do NOT use ink or ballpoint pens.
- Make heavy black marks that fill the circle completely.
- Erase cleanly any answer you wish to change
- Make no stray marks on the answer sheet.

DO NOT

WRITE

IN THIS

SPACE

93

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APPENDIX D

DEFINITIONS OF THE GROUPS OR VARIABLES

APPENDIX D

DEFINITIONS OF THE GROUPS OR VARIABLES

Name of Group or Variable	Definition	Number N
1. AGE		
1	17 ≤ Age ≤ 18	117
2	19 ≤ Age ≤ 20	270
3	21 ≤ Age ≤ 23	147
4	24 ≤ Age ≤ 30	100
5	31 ≤ Age ≤ 39	91
6	40 ≤ Age ≤ 50	61
	TOTAL	786
2. MATH A	Students seeking to enroll or enrolled in elementary algebra	367
3. MATH D	Students seeking to enroll or enrolled in intermediate algebra.	406
4. GENDER		
Male	Self-Assessed	368
Female	Self-Assessed	405
5. VOCATIONAL	Those responding A to Item 98 having removed those responding D or E to Item 83.	99
6. TRANSFER	Those responding D or E to Item 83.	476
7. DISABLED	Those responding A to Item 90.	60

8. **MATH ANXIOUS**	An anxiety scale was created using the responses to Items 31 through 41. See Chart 31 (on the next page) which shows the math anxious frequency diagram and the resulting scale. A student is to be included in the Math Anxious group provided their score falls above the 60th percentile (an "anxiety" score of 20 or more).	325
9. **UNDER-PREPARED**	Because some respondents answered both Items 93 and 94, their responses were removed from two of the "under-prepared" subgroups defined below. Charts 32 and 33 (on the following pages) display the respondents in these two groups.	
	a. Under-Prepared for College Level Math consists of all the population enrolling in Math A or Math D.	818
	b. Under-Prepared for Math A includes those "repeating" Math A or Elementary Algebra and an "at risk" subgroup.	153
	(i) The "repeating" members consist of those who marked C to Item 93 and did not answer Item 94 and those who answered D to Item 94 and did not answer Item 93.	
	(ii) For those who answered only Item 93 the "at risk" subgroup consists of response [A for Item 93] or [B provided their response to Item 95 was C, D, E or F]. Note: It is believed that two years or more of doing no math puts one "at risk" especially given the respondents ages and the fact that they are enrolling in Math A, Elementary Algebra.	

Chart 31: Math Anxiety Scale

```
ANXIETY
   COUNT       VALUE

       2         .00 .*:
       1        1.00 .* .
      10        2.00 .****:*****
      11        3.00 .*****:*****
       7        4.00 .*******.
      15        5.00 .*********:*****
      18        6.00 .************:*****
      20        7.00 .****************:****
      19        8.00 .******************:
      21        9.00 .*********************.
      23       10.00 .************************.
      41       11.00 .*********************************:***********
      37       12.00 .************************************:***
      20       13.00 .*********************
      30       14.00 .*******************************
      37       15.00 .************************************.
      47       16.00 .*********************************************:****
      43       17.00 .*********************************************.
      34       18.00 .***********************************
      37       19.00 .************************************.*
      40       20.00 .**************************************** .
      37       21.00 .************************************.
      46       22.00 .************************************:**********
      40       23.00 .*********************************:********
      39       24.00 .*******************************:***********
      20       25.00 .*********************
      24       26.00 .***********************:**
      23       27.00 .*******************:****
      12       28.00 .************
       8       29.00 .********
      23       30.00 .*********:**************
      11       31.00 .*******:***
       6       32.00 .*****:
       3       33.00 .***.
       2       34.00 .**.
       1       35.00 .*.
                     I.........I.........I.........I.........I.........I
                     0         10        20        30        40        50
                              Histogram Frequency
```

Mean	17.434	Std Err	.256	Median	18.000
Mode	16.000	Std Dev	7.268	Variance	52.826
Kurtosis	-.625	S E Kurt	.172	Skewness	-.085
S E Skew	.086	Range	35.000	Minimum	.000
Maximum	35.000	Sum	14087.000		

Percentile	Value	Percentile	Value	Percentile	Value
20.00	11.000	40.00	16.000	60.00	20.000
80.00	24.000				

Valid Cases	808	Missing Cases	10

Chart 32: Underprepared for Math A

Numbers of Respondents in Categories used to Define Underprepared Group for Elementary Algebra Students								
	Item 94: If your last math class was taken in college, which one was it?							
Item 93: If your last math class was taken in high school, which one was it?	A. Advanced Arithmetic	B. Pre-Algebra	C. Business Math	D. Elementary Algebra	E. Intermediate Algebra	F. Geometry	G. Other	Not Applicable
A. Business or Consumer Math	8	2	4	2	1		7	21
B. Pre-Algebra	8	6	3	11	2	1	3	23*
C. Algebra I	5	9	10	4	4	1	5	51
D. Geometry	3	4	4	8	3	1	8	28
E. Algebra II		1	3	2	1		4	12
F. Algebra II with Trigonometry	1	1					2	6
G. Other	6	6	1	4			6	11
Not Applicable	14	6	9	13	2	2	4	15

Chart 33: Underprepared for Math D

Numbers of Respondents in Categories used to Define Underprepared Group for Intermediate Algebra Students								
	Item 94: If your last math class was taken in college, which one was it?							
Item 93: If your last math class was taken in high school, which one was it?	A. Advanced Arithmetic	B. Pre-Algebra	C. Business Math	D. Elementary Algebra	E. Intermediate Algebra	F. Geometry	G. Other	Not Applicable
A. Business or Consumer Math	4	2		8	1		2	1
B. Pre-Algebra		2		15	2		1	3
C. Algebra I		2	5	23	6	2	4	14*
D. Geometry	3	8	1	11	3	1	7	32*
E. Algebra II	2	5	1	11	6		1	40
F. Algebra II with Trigonometry	1	1	3	2	2	1	7	15
G. Other	1			9	2		4	6
Not Applicable	1	8	2	110	8	6	8	4

Underprepared Students

Prepared Students

Assigned Missing Value for Prepared Status

* Defined as prepared if class taken within last two years (Item 95)

	(iii) For those who answered only Item 94 the "at risk" group consists of those who answered [A, B or C and their response to Item 95 was C, D, E or F].	
	c. Under-Prepared for Math D: Includes those repeating Math D and an "at risk" group.	107
	(9) the "repeating" members consists of those who answered only Item 93 with E or only Item 94 with an E.	
	(ii) For those who answered only Item 93, the "at risk" subgroup consists of those responding A, B, E, F or [C or D given a response to Item 95 of C, D, E or F for each].	
	(iii) For those who answered only Item 94, the 'at risk' subgroup consists of those responding A, B, C, F or [D given a response to Item 95 of C, D, E or F].	
10. RE-ENTRY	a. Re-entry to school C, D, E or F to Item 97	111
	b. Re-entry to math C, D, E or F to Item 95	251
11. UNDER-REPRE-SENTED	Any response to Item 84 other than D or blank.	172
12. SINGLE PARENT	Response C to Item 86	60

APPENDIX E

PROFILE GUIDE

APPENDIX E

GROUP NAME: _____

GROUP PROFILE

Selected Background Items

high school diploma
transfer students
number of class (semester) units
1 to 8
9 to 14
15 or more

re-entry into school
4 or fewer years
more than 5 years

re-entry into math
2 or fewer years
more than 2 years

gender
male
female

age
17-18
19-20
21-32
24-30
31-39
40-50

area of strongest interest
humanities/fine arts/english
social science
math/natural science/engineering
communications/media
business
teaching
computer science
general studies/liberal arts
undecided

Explanation: The background items displayed here introduce you to the group. Percentages based on the valid number of responses will be given as well as the number in the group.

If appropriate, the percentages occurring in the response categories will be reported.

Definition:

a. re-entry into school means no college or high school for five or more years for students.

b. re-entry into math means no math for 2 or more years. (There was a typing error in this item, #95, so the decision was to include in this group all students responding to choices C, D, E or F.

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Summary of Selected Items

I. Why this Class?
ranked #1
#2
#3

Explanation: There were six subsections of the SCASS besides the background information. They are the six major headings in this portion of the profile.

In Section I. Why are you here? The students were to respond to ten statements and rate them as to how important each was to their decision to enroll in an algebra class. What is reported in the Profile are those items that obtained the highest three relative frequencies in the "fairly" to "very important" range' which were then ranked according to size.

II. Learning Preferences
ranked #1
#2
#3

Definitions: In Section II - Learning Preferences and Practices:

a. A learning preference is an activity or belief that the student thinks is or will be beneficial to them.

b. A learning practice is an activity that the student says is practiced by them when studying.

III. Math Reflex (Math Anxiety)
percentile (low) #1
#2
#3
#4
(high) #5

See the definition of math anxious for the anxiety scale used in reporting this information.

IV. Attitude
percentile (negative) #1
#2
#3
#4
(positive) #5

Definition: Questions from Section IV to the survey were selected. An attitude scale was constructed in the same manner as the anxiety scale. See Chart 34 (on the next page) for the scale. Percentiles were used to set the scale from very negative to very positive.

Chart 34: Attitude Scale

```
ATTITUDE
  COUNT      VALUE

      3       8.00 .:*
      0       9.00 ..
      4      10.00 .*:*
      8      11.00 .***:*
      9      12.00 .*****:
     10      13.00 .*******.
     19      14.00 .***********:*
     34      15.00 .***************:*******
     27      16.00 .******************  .
     38      17.00 .*************************.
     43      18.00 .******************************  .
     58      19.00 .*************************************:***
     58      20.00 .*****************************************.
     57      21.00 .*****************************************   .
     64      22.00 .*********************************************:
     58      23.00 .*****************************************   .
     53      24.00 .************************************    .
     56      25.00 .************************************:*
     48      26.00 .*********************************:*
     38      27.00 .*************************.
     38      28.00 .*********************:****
     29      29.00 .***************:***
     24      30.00 .***********:****
     17      31.00 .*******:***
     15      32.00 .*****:****
                   I.........I.........I.........I.........I.........I
                   0         15        30        45        60        75
                            Histogram Frequency
```

Mean	22.026	Std Err	.174	Median	22.000
Mode	22.000	Std Dev	4.958	Variance	24.583
Kurtosis	-.476	S E Kurt	.172	Skewness	-.130
S E Skew	.086	Range	24.000	Minimum	8.000
Maximum	32.000	Sum	17797.000		

Percentile	Value	Percentile	Value	Percentile	Value
20.00	18.000	40.00	21.000	60.00	23.000
80.00	26.200				

Valid Cases	808	Missing Cases	10

V. Self-Description

What kind of h.s. student?
poor
good
excellent
don't know

Ability to solve algebra problems?
poor
good
excellent
don't know

What kind of math student?
poor
good
excellent
don't know

What kind of college student?
poor
good
excellent
don't know

Important to success in algebra?
Ranked #1
#2
#3

VI. World View

math = rules
disagree
undecided
agree

math = research
disagree
undecided
agree

no team skills taught
disagree
undecided
agree

no learning resources
disagree
undecided

Explanation: How students view mathematics and how it is used in the world is of interest. Allan H. Schoenfeld uses a "belief system" as a category in his system for explaining people's behavior when solving math problems. (Schoenfeld, 1985). He defines a belief system as one's "mathematical world view,' the set of (not necessarily conscious) determinants of an individual's behavior about self, about the environment, about the topic and about mathematics (Schoenfeld, 1985).
Consequently, an effort was made to draft some questions and collect this kind of information in Sections V and VI of the survey. Results of selected items will be reported in the "Group Profile".

agree

peers under-prepared
disagree
undecided
agree

peers willingly work hard
disagree
undecided
agree

peers do only enough to get by
disagree
undecided
agree

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